

Radio Control 47380

CASTOR SECRETS REVEALED

CAR ACTION

June 1996

THE WORLD'S LEADING R/C CAR MAGAZINE

Testing
Team Losi's
GTX
Gas Truck

**MONEY
SAVING
TECH
TIPS**

**MAKE YOUR
TIRES LAST
LONGER**

**BUILD YOUR OWN
STARTER BOX**

WHEN TO MODIFY

**HOW TO
Choose Off-Road Tires**



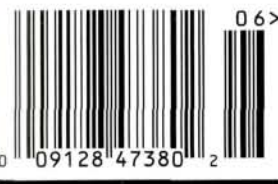
**◀ Racing
Trinity's
Revolver
22j**

**Hopping
up** Team
Associated's
RC10T2



USA \$4.95

CANADA \$5.95



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ON THE COVER: (clockwise from top) the Team Losi GTX (photo by John Howell); 2nd Look—Associated's RC10T2 (photo by Walter Sidas); Trinity's Revolver 22j (photo by Doug Mertes); selecting off-road tires (photo by Bill Carter).

THIS PAGE (top to bottom): the Tamiya Ford F-150 (photo by Walter Sidas); Project F1—complete and ready-to-win (photo by Mike Ogle); Airtronics Caliber 3Ps (photo by Walter Sidas).



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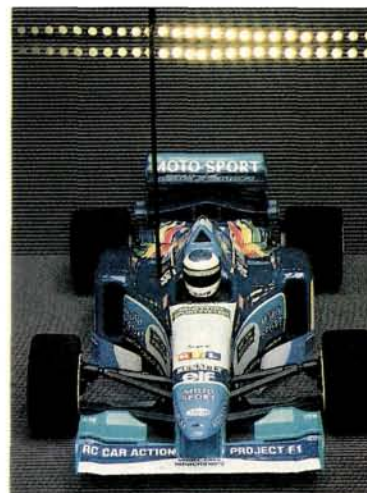
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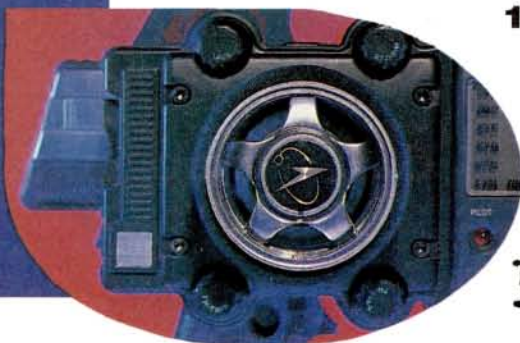


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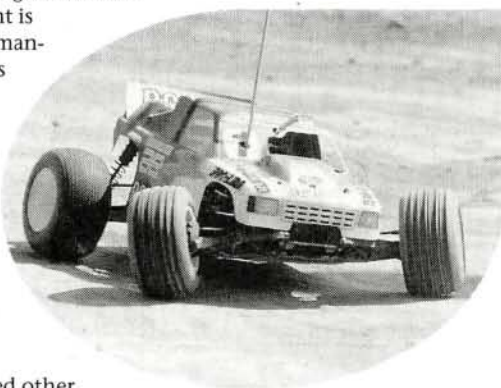
As someone who likes to keep his eye on trends, I reacted with satisfaction when Team Losi unveiled its new 1/10-scale, gas-powered racing truck—the GTX (see the review in this issue). Like the last holdout on an otherwise unanimous jury, Losi's long-awaited foray into gas power validates the 1/10-scale gas market and almost certainly ensures that things will get even bigger and better.

When I first drove a Kyosho Outlaw Rampage gas truck back in '91, I knew from the first squeeze of the throttle trigger that 1/10-scale gas would be big someday. Virtually unlimited run time plus the sound and smell of their tiny glow engines have endeared these vehicles to the "backyard basher" community, i.e., those who cherish time spent behind the transmitter more than formal competition.

Goin' Gas

But the introduction of purpose-built racing vehicles, most notably the Associated RC10GT, the Kyosho Outlaw Rampage Pro and, of course, the new GTX, is causing quite a few former "electric-only" racers to give gas a serious look. The 1/10-scale gas segment is no longer the sole domain of fun-type monster trucks and basher buggies; it has become a serious racing class.

Is this good? I think so. Certainly, the popularity of gas racing trucks won't threaten the well-being of the gas-monster-truck set. In fact, that segment is doing so well that, for some manufacturers, gas monster trucks have become some of their all-time best-sellers. The development of a competitive racing class for 1/10-scale gas vehicles will broaden the entire hobby and give serious (and not-so-serious) racers one more option.



RACING RADIO GUIDE

Technology hasn't overlooked other aspects of the radio control hobby, either. Since the release of the first high-end, "mega" radio, it seems as if manufacturers have been engaging in electronic one-upmanship—much to the delight of the knowledgeable and to the chagrin of newcomers. We commissioned contributing author and resident electronics expert Stan VanDruif to produce a follow-up to his "Budget Radio Guide" (published in the November '95 issue); we're very pleased with this issue's "High-End Radio Guide."

Stan has distilled and defined all that confusing radio lingo and sorted through the incredible number of features that the average top-line radio system comprises. If you've thought about buying one of these "do it all but drive the car for you" systems, or if you own a racing radio but still don't know how to use all its functions (hey, I still can't set the clock on my VCR!), then by all means, turn right to this feature.

Frank Masi, Executive Editor

We want to hear from you! Write, fax, or e-mail us on the Internet: R/C Car Action, 251 Danbury Rd., Wilton, CT 06897-3035; fax: (203) 762-9803; e-mail:

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LETTERS

Painting and Peaking

First, your magazine is my favorite. Every month, I anxiously await the latest issue, and I just renewed my subscription. I especially liked your article about the Worlds race in Japan and the articles dealing with the cars of IFMAR world champions Matt Francis and Mark Pavidis and ROAR national champ Brian Kinwald. These articles allow readers to see which type of equipment they used in their vehicles, and that allows us to possibly recreate the performance of their cars.

The first question I have deals with painting. Which colors should be painted first? I've heard that darker colors should be painted first on the body, but I've also heard the opposite. Which is correct? One more question: what happened to Pro-Tech Inc.? I was planning to buy a peak charger from them, but I

can't find their products anywhere.
STEFAN FAUSCH
Madison, WI

I'm pleased that you liked our Worlds coverage and our feature articles on the championship-winning cars. It seems as if you're not alone, because the IFMAR World Championships article won—by a landslide—our "Readers' Choice Award" for favorite article of 1995.

On to your questions. As a rule, you should paint the darker colors first, but as you know, rules are made to be broken. In some cases, you won't have any choice but to paint the lighter colors first. If you apply the lighter colors first, back them up with a coat of white or silver paint. This will ensure that the darker colors won't show through, blend, or bleed into the lighter colors.

I've had a few letters, e-mails and calls regard-

ing Pro-Tech chargers, so I did a little investigating. We have two phone numbers on file, and both of them have been disconnected. I also called a few larger hobby chains to see whether they had some chargers in stock, but none of the shops carry them anymore. My guess is that the company has gone out of business, or has relocated and didn't inform us (and the world) that they moved.

George

Ballistic Rustler

I own a Traxxas Rustler truck that is totally box stock, including the radio. I would like to put a Kinwald Dirtinator modified motor in it. I understand that if I install this motor in it without a slipper clutch, it could damage the tranny. Is this true? And could the Schumacher Viscous Drive unit be adapted to my truck? And can the mechanical speed control

handle a 12-turn Kinwald motor? Also, what is the best way to break in a motor without expensive equipment? Your answers would be appreciated, and thanks for introducing me to this great hobby.

BILLY SAUVE
Camillus, NY

Billy, if you pop a 12-turn Trinity Dirtinator motor into your Rustler without a slipper clutch, you will almost certainly blow up your tranny. On the other hand, if you do install a slipper clutch on your truck's tranny, you'll be able to run just about any motor. You might want to consider adding bearings to the tranny as well to further "bullet-proof" it. Traxxas sells a Hydra Drive top shaft (no. 1993X) for \$10 that will allow you to install a Team Losi Hydra Drive in your Rustler, but you can't adapt it to run the Schumacher Viscous Drive.

There are many ways to break in a new motor

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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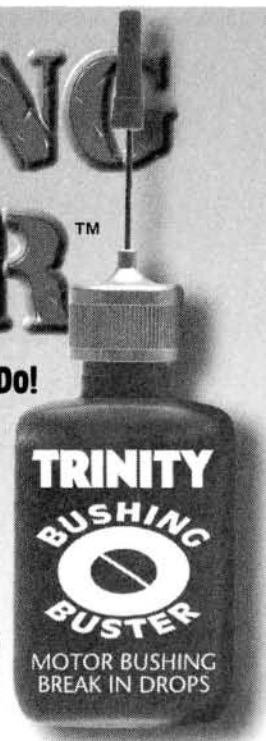
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LETTERS

economically. I have a 4-cell battery pack that I use specifically for breaking in new motors. I place my motor in a homemade jig, put a couple of comm drops on the brushes, connect the battery leads to the motor posts and let the motor run for 5 minutes. After I've broken in the motor, I give it a shot of motor spray to clean out the brush deposits. That's all there is to it.

George

One-Way Choices

First, I guess a little kissing up is in order: your magazine is the best! I just bought a brand new HPI RS4, and I'm thoroughly convinced that it's the best car to come

along in a while. I run mine completely stock, including the bushings, and I won my first race with it; I love it. My question is: what's the difference between the one-way diff and the one-way pulley? Also, when do you plan to grace us with a review of this fine car?

MARK GIORDANO
Manhattan Beach, CA

Hey, Mark, you don't have to kiss up to us, just keep subscribing! You're right; the HPI RS4 is a really sweet car. I love mine, too. The purpose of a one-way unit, i.e., a one-way diff, or a one-way pulley, is to allow the front tires to freewheel under acceleration and when you brake. In other words, your car

will feel like a 4WD when accelerating and like a 2WD when braking or coasting.

Installing the one-way diff will eliminate the front diff altogether and will make the car steer better going into corners and when you brake. The steering coming out of the corners will also be quicker, and the car will have more straight-line stability with the one-way diff installed. According to HPI, the one-way diff is the hot ticket for large, high-grip tracks.

On the other hand, the one-way pulley does the same thing, but the front diff is retained, and that can be an advantage on short, twisty tracks. I haven't tried them both out yet because of poor

weather here in the NE, but most of the RS4 drivers I've bench-raced with agree that the one-way diff is the only way to go.

Our May 1996 issue features a killer thrash test on this touring car. Check it out!

George

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MODEL IMPROVEMENT

WITH RON AILER AND HOBBY BOBBY

GEE BOBBY, YOU SURE HAVE BEEN BLOWIN' MY DOORS OFF LATELY! WHAT'S YOUR SECRET?

OH, I DON'T KNOW, 'JUST LUCKY I GUESSES.

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SSSSSSOME-THING DIFFERENT?

YEAH! I'VE NOTICED YOUR ENGINE IS RUNNING SMOOTHER TOO! DID YOU GET A NEW ONE, OR ARE YOU ON SOME NEW KINDA FUEL?

NO, SSSSSAME OL' ENGINE, SSSSSAME GASSSSSSS.



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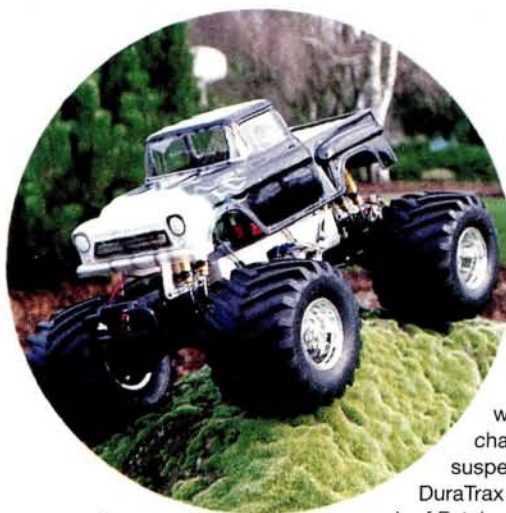


CATTLE DRIVE

Kevin Bobb's Traxxas Stampede is ready to crush anything in its path. Kevin, of Cold Spring, NY, modified his truck with a full set of ball bearings, Deans pins, a Novak Rooster, and Futaba radio gear. Kevin applied the airbrush job himself. It's pretty wild-looking, Kevin—good job!



"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fifth annual "Reader's Ride of the Year Contest" in the fall of 1996. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.



BODACIOUS BOWTIE

Corey Pischel of Canby, OR, sent us this photo of his first R/C car—this tricked-out Kyosho USA-1. With help from his cousin Adam, Corey took a stock USA-1 and replaced all the bushings with bearings. Next, the stock chassis was replaced with a stretched aluminum chassis with a customized 4-link suspension. Other mods include DuraTrax oil shocks, titanium tie rods, a pair of Futaba 9303 high-torque servos, a Novak 610 HRV ESC, two modified Trinity Onyx motors, Thorp ball diffs with telescoping drive shafts, a custom-built wheelie bar, and a 7-cell 1700 SCR battery pack. A Parma '57 Chevy, painted by Greg Larsen, sits atop the aluminum chassis, and a Futaba Magnum Jr. controls the ride. According to Corey, this truck screams up hills and climbs over anything in its path.

TRICKED-OUT TEAM CAR

Bob Woish's RC10 Team Car has been set up with a Novak Rooster ESC and a Futaba Magnum Sport 2PB; he also uses LiteSpeed connectors so that he can switch from a Trinity Ruby (16-turn triple) to a Reedy 20-turn mod motor or a stock 540 motor. Bob, who hails from Conshohocken, PA, uses various pinions from Robinson with these motors for different types of racing. The wheels and street tires that you see here can be quickly exchanged for off-road tires when it's time to hit the dirt. The finishing touches include an RPM front bumper and a Pro-Line Magnum body (the lettering was done with decals from Autographics and Team Associated).

SITTIN' PRETTY

This tricked-out Team Losi Double-XT comes to us from Vincent Edwards of Killingworth, CT. Vincent's great-looking Double-XT is equipped with a Tekin G12 ESC, an Airtronics 94738 servo and a modified Trinity Onyx motor; it's controlled by a Futaba 2PD AM radio. Other mods include a set of graphite arms, titanium turnbuckles and a Trinity purple screw kit; Losi Silver tires were installed on the rear and Pro-Line Edge tires are up front. Vincent custom-painted the body and wheel covers with his Badger 150 airbrush. It looks pretty sharp, Vincent; it does hit a track now and then, doesn't it?



In search of fun
and glory, 'cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE SCOOP



MONKEY MAN ON THE LOOSE

In a scientific experiment gone terribly awry, *R/C Car Action's* senior editor was transformed into this crazy Congo concoction that you see here before you! How did it happen? Well, have you ever seen those classified ads that request volunteers for medical experiments for a measly \$10 payment? Editor Chris Chianelli (obviously bored beyond belief) decided one day to subject himself to one of those experiments. Anyway, if you see this man/thing roaming the streets or the produce section of your local supermarket, please don't approach him. Contact your local authorities or Agent Scully of the "X-files" to help stop this beast. It's a menace to society and to fruit vendors everywhere!

The Little Engine That Could

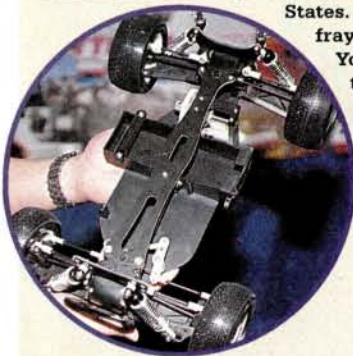
I've always been a big fan of gas-powered vehicles; you know that. Well, this new engine from Dynamite has me pretty excited. Dynamite took its two years of experience in pounding tracks all over the country and refined its original TNT.12 to come up with the all-new TNT.12R. According to sources at Horizon, the new TNT.12R still has the excellent piston/sleeve life, great power and economical price of the original, yet it performs better and more reliably, and it is easier to adjust.

The new engine offers enhanced idle, low-speed tuning and midrange performance, and it lasts even longer. Other hot features include Dynamite's new Super Rod, which is lighter and helps the engine achieve greater acceleration and higher rpm. Dynamite's new Super Seal front bearing helps give the engine consistent idling traits, because no air can leak past the main bearing. The low-speed needle is now O-ring sealed. It features a new taper and needle shape, which gives the engine a broader adjustment range and a more linear midrange, without loading up. Best of all, the new TNT.12R comes with a full, two-year factory warranty! For more information, contact Horizon Hobby Distributors at 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.



COOL CAR, WEIRD NAME

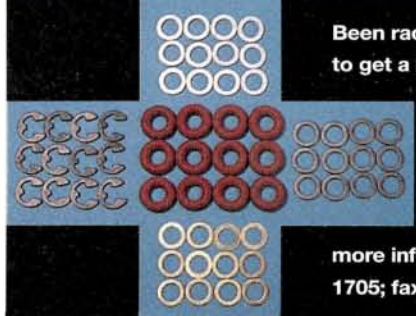
New from Yokomo is this off-road, 4WD buggy that goes by the name Hot Dog 4. In a world in which R/C car names are an alphabet soup (ZX-R, RS4, YZ-10, MP-5, RC10GT...you get the idea), it's odd to find a car with such an...interesting name. It's sure to make waves in the entry-level, 4WD, off-road category. Some of you might find that it looks familiar; that's because it's based on the popular YR-4 touring-car chassis (which is actually based on the Super Dogfighter). With a car of this quality, Yokomo should have no problem generating some interest in 4WD, off-road vehicles here in the States. We just need some other wildly named cars to enter the fray. I can just hear race announcer... "And here comes the Yokomo Hot Dog around the first corner, quickly followed by the Kyosho Granola Bar and the Schumacher Breakfast Burrito. Hot on their tails is the Predator Ding Dong, followed by the Tamiya Rookie Rabbit...." Hey, it could happen. For more info on this Yokomo product, contact GHI at P.O. Box 5872, Orange, CA 92613; (714) 921-0322.



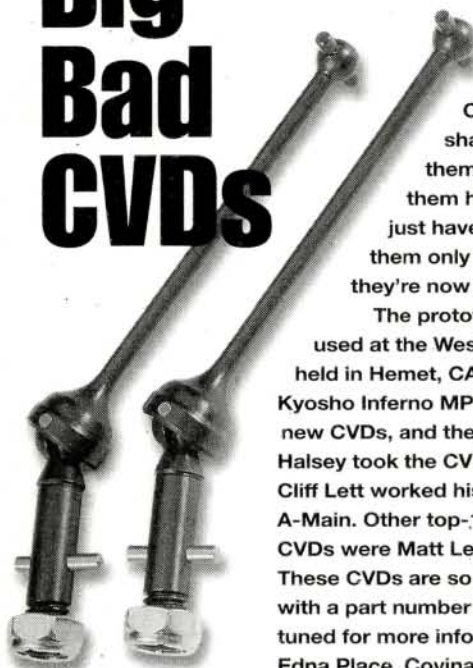
TRINITY TIGHTENS TOLERANCES

Been racing your Team Losi Double-X or Double-XT for a while now? Is your suspension starting to get a little loose or sloppy? Why don't you take a few minutes to tear it down and make it feel as tight as new again, without buying any new suspension pieces? Impossible, you say? Check out this new Suspension Shim kit (part no. PK3004) from Trinity Products for both Team Losi's Double-X and Double-XT. It has all the O-rings, E-clips, shims and spacers you'll need to bring your truck's or buggy's suspension back to top form. The kit sells for \$3.99 (yes, it's a little bit cheaper than buying new suspension pieces). For

more information, contact Trinity Products at 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



Big Bad CVDs



MIP has had great success in hop-up parts with its Constant Velocity Drives (CVD) drive shafts. World champs have sworn by them, and most off-road racers have put them high on their list of mods that they just have to have. For a while, MIP offered them only to the 1/10th-scale crowd, but they're now available for 1/8-scale gassers!

The prototype CVDs seen here were recently used at the West Coast Gas Off-Road Challenge held in Hemet, CA. MIP team drivers equipped their Kyosho Inferno MP-5s and Mugen Athletes with the all-new CVDs, and they put on an impressive show. Jay Halsey took the CVDs to the top-qualifier position, and Cliff Lett worked his way up from a semifinal to win the A-Main. Other top-10 A-Main drivers who used the new CVDs were Matt Ledger, Kris Moore and Chris Walrod. These CVDs are so new that MIP has yet to come up with a part number or an official release date. Stay tuned for more info, or contact MIP directly at 746 E. Edna Place, Covina, CA 91723; (818) 339-9008.

Blazing Infernos

At the West Coast Gas Off-Road Championship in Hemet, CA, Kyosho cars were out in full force! In the 1/8-scale buggy A-Main, the Kyosho Inferno MP-5 was the car to have. Eight of the 10 cars in that event were MP-5s, and they took the top seven spots; Cliff Lett claimed the overall win (Jammin' Jay Halsey top-qualified with the car). In the 1/8-scale truck A-Main, Kyosho driver Tim Long piloted his Inferno ST to the win. Out of the nine racers in that Main, the first seven were Kyoshos. To top it off for Kyosho, Kris Moore TQ'd and took the victory in the 1/10-scale buggy class with his Inferno 10. Not too shabby!



Trinity Presents The SPEED GEMS Collection



-TOPAZ-
4WD Buggy/1:10 Oval
11 Turns, 3 Winds
36,750 RPM, No. 9200



-RUBY-
2WD Trucks/Buggies
16 Turns, 3 Winds
25,600 RPM, No. 9201



-SAPPHIRE-
Monster Trucks, Planes, Boats
17 Turns, 1 Wind
24,150 RPM, No. 9202



-DIAMOND-
1:10 On-Road/Oval
12 Turns, 2 Winds
33,750 RPM, No. 9203

Protoform Drops The Bomb



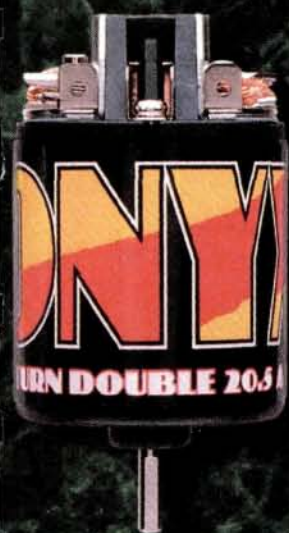
Check out this hot new Protoform body for Team Associated's B2, modeled by Tim Clark of Pro-Line. To keep dirt out, the body, code-named "Bomber," fits the chassis just right in all the critical areas; it even has a built-in air scoop to help keep your ESC running cool. The body, part no. 1511, is made of 0.030-inch-thick Lexan; it comes complete with a wing, and it retails for \$15.95. For more information, contact Protoform at P.O. Box 456, Beaumont, CA 92220.



The OPS Option

Are you a gas guru? If you truly are, then the name "OPS" should ring a bell. It's an Italian engine company that makes some potent nitro engines for boats, planes and cars. It's world-renowned for quality and excellent performance, and Great Planes is its new, exclusive distributor. So if you're looking for a new .15 or .21 engine for your truck or buggy, check with Great Planes at P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-3630; fax (217) 398-0008.

Rare Examples Of Performance And Economy.



Speed Gems machine wound modified motors are an excellent alternative for a racer on a budget. Constructed with the same superior quality components as our expensive modified motors, they have a machine wound armature. This combination produces an extremely fast motor at about half the cost of a hand wound. Only \$49.99 list. For a rare combination of performance and economy, acquire a Speed Gem today.

-ONYX-

2WD Trucks/Buggies
14 Turns, 2 Winds
29,100 RPM, No.9204

-JADE-

2WD Trucks
15 Turns, 4 Winds
27,060 RPM, No.9206

-QUARTZ-

Touring/F-1, Planes, Boats
19 Turns, 2 Winds
21,540 RPM, No.9207

TRINITY

1901 East Linden Avenue, Suite 8
Linden, New Jersey 07036
Telephone (908) 862-1705
Facsimile (908) 862-6875

WHAT'S new

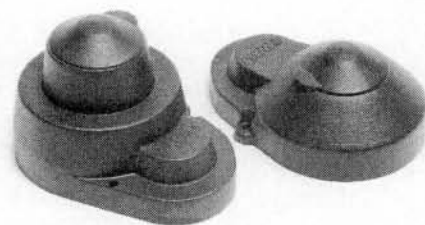


PARMA 1997 Ford F-150

Made of 0.040-inch-thick clear Lexan, this 1/10-scale body features a new, rounded, aerodynamic design that looks great mounted on most truck chassis, including the Parma Good Time chassis and the Tamiya Blackfoot monster truck.

Part no.—10204; price—\$19.

Parma Intl. Inc., 13297 Progress Pky., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.



RPM Gear Covers for the RC10B2

Molded of black, durable nylon, these covers are attached using the Allen screws provided—no cutting or drilling required. The large-diameter soft plug allows easy access to your slipper or Hydra.

Part nos.—8028 (fits stock slipper); 8032 (fits Hydra with drive); price—\$5.95.

RPM, 14978 Sierra Bonita Lane, Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.

TRINITY

Team Kinwald Formula '96

Developed by Brian Kinwald and Greg Hodapp and used exclusively by them until now, these new, specially formulated power drops increase horsepower

in all off-road and on-road stock and modified motors.

They contain a special agent that repels dirt from the commutator to keep the comm clean while breaking in the brushes.

Part nos. and prices—TK2001 (1.5 ounces), \$5.99; TK2002

(2-ounce refill), \$6.99.

Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



PRO-LINE

ZR-80 Speed Hawks

These treads were designed for all-out speed on asphalt and concrete and on any parking-lot surface. Use these aggressive tires to convert your off-road stadium truck into a mean street machine.

Part no.—1080 (2.2 in. front or rear truck wheel); price—\$17.95.

Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

DREMEL

7700 2-Speed MultiPro Cordless

The 2-speed MultiPro (formerly Moto-Tool) features a rechargeable, 3-hour battery pack that allows the tool to be completely portable. It has a knurled collet nut that accepts Dremel accessories with a shank up to 1/8 inch in diameter. The tool comes fully stocked with 25 bit accessories, a battery charger and a portable storage case.

Price—\$49.95.

Dremel, P.O. Box 1468, Racine, WI 53401-1468; (414) 554-1390; fax (414) 554-7654.



PRO-MATCH

Competition Batteries

All cells of these new batteries are matched as closely as possible on all numbers, including charge time, to allow maximum performance from them all. The packs come assembled and use high-quality battery bars (lead wire and connector not included) and are 100 percent guaranteed.

Part nos. and prices—call.

Pro-Match Competition Batteries, 1850 McCulloch Blvd., Ste. B, Lake Havasu City, AZ 86403; (520) 855-2226.



MIP

Zero Maintenance Lightweight Ball Steering for the RC10T2

This smooth, strong, steering system is made of virgin, glass-filled nylon and features machined-aluminum steering posts, Teflon™-sealed ball bearings and light, super-rigid, plastic bellcranks.

Part no.—1080; price—\$29.95.

MIP, 746 E. Edna Pl., Covina, CA 91723; (818) 339-9007; fax (818) 966-2901.



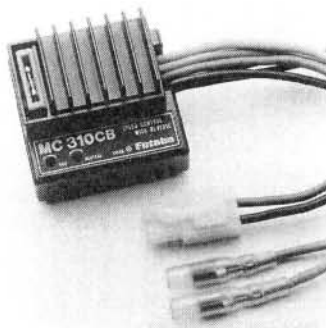
FUTABA

MC310CB

This high-performance, reversing ESC, which replaces the MC111B, is 35A fuse-protected and has a built-in heat sink. It comes pre-wired with a battery plug, a switch and Tamiya-type motor plugs.

Part no.—MC310CB; price—\$199.95.

Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718; (714) 455-9888; fax (714) 455-9899.



TAMIYA

Mercedes-Benz 1838 LS

This 1/14-scale big rig has a metal chassis with shortened wheelbase, leaf-spring suspension with aluminum coil-over shocks, custom-plated wheels and semi-pneumatic tires. It also has a servo-controlled, constant-mesh, 3-speed transmission that requires a transmitter with three or more channels.

Part no.—56305; price—\$529.

Tamiya America, 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A.



TEAM LOSI

Titanium-Nitride Shock Shafts

These new shafts feature micro-finished, aircraft-alloy, stainless-steel construction, and they offer smoother operation and greatly extended wear. Every shaft is precision-coated with ultra-hard titanium nitride to increase surface hardness and lubricity. They are available in three lengths.

Part nos.—A-5060 (0.6 inch); A-5061 (0.9 inch); A-5062 (1.2 inch); price—\$7.

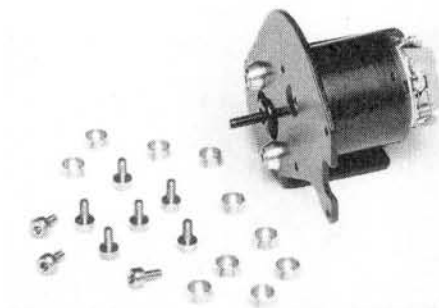
Team Losi, 13848 Magnolia Ave., Chino, CA 91710; (909) 465-9728; fax (909) 590-1496.

LUNSFORD RACING

Fat Boy Short Titanium Motor Screws

CNC-matched and made of premium titanium billet, these screws feature precision-rolled 3mm threads and a standard 2.5 hex. The larger-diameter heads and special aluminum washers hold your motor more securely with less weight than conventional steel screws do, and they make gear-mesh adjustments smooth and more accurate.

Part no.—F-900; price—\$5.75.



Lunsford Racing, 2500 Three Lakes Rd., Ste. A, Albany, OR 97321; (503) 928-0587; fax (503) 967-5917.

Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by Radio Control Car Action or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in Radio Control Car Action. Manufacturers! To have your products mentioned here, send press releases to R/C Car Action, What's New, 251 Danbury Rd., Wilton, CT 06897.



TRUBLE SHOOTING

by George M. Gonzalez

Troublesome Diff

I own an MRC MT-10S stadium truck. Although I am very pleased with its performance, I am having difficulty setting the tightness of the ball diff. I followed your directions on setting and

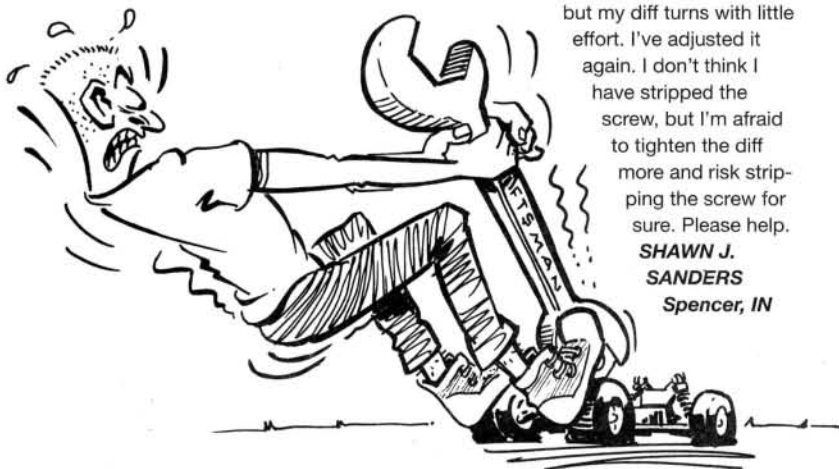
adjusting the diff and slipper clutch (Feb. '95 issue), but when I tested the spur gear, it slipped when I pushed it really hard. You said that it should be extremely hard—if not impossible—to turn, but my diff turns with little effort. I've adjusted it again. I don't think I have stripped the screw, but I'm afraid to tighten the diff more and risk stripping the screw for sure. Please help.

SHAWN J. SANDERS
Spencer, IN

Shawn, I had the same problem with my MRC MT-10S truck. I found that the diff was tight enough for slippery surfaces, such as an off-road track, but when I drove on a high-traction surface, such as a parking lot, the diff would slip, no matter how much I tightened the diff nut. Here's what I did to correct the problem. First, I rebuilt the diff, using Associated Stealth diff lube on the diff balls. I also used Associated black grease on both thrust-washer assemblies (one for the diff and one for the

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897-3035. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

slipper). Next, I replaced the stock diff nut and diff screw with an Associated diff nut and diff screw, part no. 6575. After I had made these modifications, my truck's diff stayed tight—even on high-traction surfaces. Give it a try; you'll be pleased with the results.



Suffocating Spider

I have a new Kyosho GP-10S Spider Opel Calibra with the GS-11X glow engine. I broke the engine in properly, but my problem is that the car stalls randomly at idle, when it's decelerating and when the engine is revving steadily. The problem seems to have worsened as the engine became broken in, and of course, it stalls the moment I put on the body. I don't want to carve more holes in the body for the glow starter or pull starter.

I've tried various mixture settings, replaced glow plugs, tried three different diameters of fuel tubing, drilled out the fuel-tank hose ports for increased fuel flow—all without success. I'm running 10-percent-nitro fuel as recommended by my local hobby shop. This is my first gas car, but I don't think this problem is normal.

Does it sound like a fuel or glow problem? Can the muffler be modified to provide more pressure? I've thought

about adding a battery and glow connector to keep the plug hot to see whether it helps. Is it reasonable to expect it to run a whole tank full without quitting?

BRIAN HOOD
Btalont@aol.com

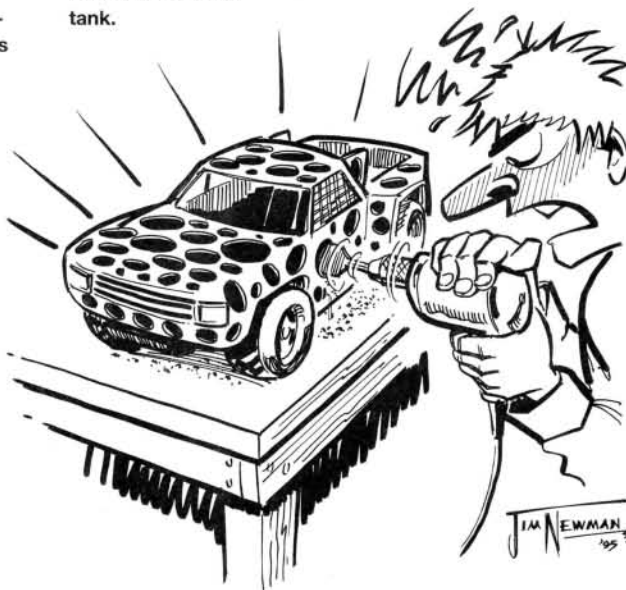
Brian, it sounds as if you've made a valiant effort to solve your problem. I called Great Planes Model Distributors (the U.S. distributor for Kyosho) and they gave me a few useful tips; here they are:

- Is the engine too hot to touch after it has been running for a few minutes? If so, either the high-speed needle is set too lean, or the cylinder and piston have been damaged and need to be replaced.
- Check the fuel tank for pinhole leaks by placing the tank under

water and blowing through a clean piece of fuel tubing.

- Try cutting airflow slots in the body. Proper airflow is crucial for glow engines—especially on hot days.
- To increase muffler pressure, install a shorter piece of fuel tubing from the muffler to the fuel tank.

- If all else fails, send the car to Great Planes' service center, c/o Hobby Services, 1610 Interstate Dr., Champaign, IL 61821; (217) 398-0007. I hope this information helps you out. Good luck.



Manta Ray + Prerunner = Serious Racing Truck

I know you guys hate to hear about someone screwing up a perfectly good vehicle, but please hear me out. I recently purchased a Tamiya Toyota Prerunner. If I had known that the truck had such a narrow stance, I would have passed on buying it and bought a Tamiya Manta Ray instead. Can I use the Manta Ray's suspension arms, upper links, drive shafts and steering rods on my Prerunner to widen its stance? I'll figure out how to make the shocks

work later.

WIGGO

Lakewood, OH

Well, Wiggo, the Manta Ray's front and rear suspension arms, upper links, drive shafts and steering rods can be bolted right onto your Prerunner without any modifications whatsoever. This will add more than an inch to its front and rear track and will make it much more stable, but it will affect its scale appearance. If you

don't mind that, go for it.

In fact, we had an editorial powwow on this subject, and it sounded so good that we're going to try it ourselves. Who knows? Maybe we'll write an article about it. Thanks for the idea, Wiggo!



Noise-Inflicted, Wannabe 4WD Team Car

Can Associated's Team Car be upgraded to 4WD? What about gas? Also, I have a JR Python controller, a Novak 610 HRV ESC and a well-isolated Novak Polaris 3-channel receiver. When I drive the car, it goes forward

Jonathan, MIP used to make a 4WD conversion for the Associated Team Car, but it has been discontinued. Call MIP [(818) 339-9007] to see whether they still have some in stock. Moody

Automotive makes a nitro conversion for the RC10, but it won't work with MIP's 4WD conversion. You can't have your cake and eat it, too! Moody's phone number is (708) 799-5597.

It sounds as if you did a good job trouble-shooting your glitching problem; the only

thing left to try is to have your receiver checked out by Novak. Their address is 18910 Teller Ave., Irvine, CA 92715. There will be a small fee for having your receiver checked (unless it's still under warranty and you saved your receipt), but it's probably worth it. Good luck!



a foot, stops and starts glitching like crazy. I mounted my receiver off the aluminum chassis, but nothing changed. I tried using a different set of crystals and keeping the antenna wire off the chassis, but still nothing. Please help!

JONATHAN EDWARDS
Los Gatos, CA

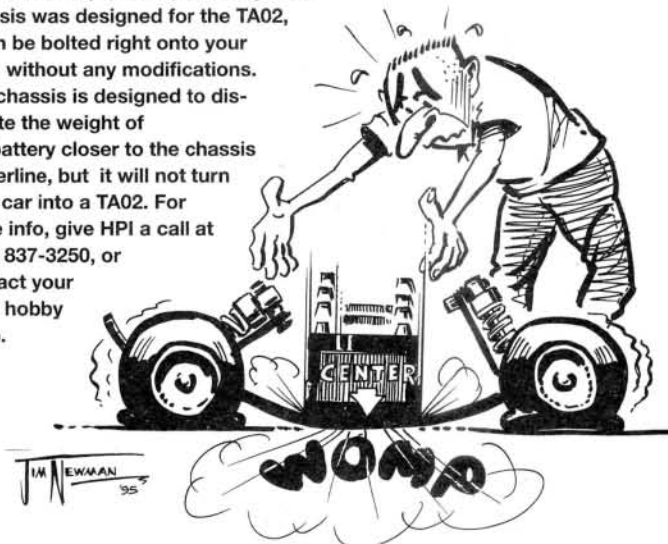
TA02 Dreaming

My first car was the Tamiya Frog, and all my cars since have also been Tamiyas. A year ago, I purchased a Tamiya GT-R Nismo (TA01), but I knew nothing about the chassis and setups available for it. In the September '95 issue's "Back Lot" page, there was a tricked-out sedan and, at that moment, I knew it was fate...until I realized it was a TA02. Help! Where can I get the chassis that I saw on that page? Would it fit on my TA01 and balance the weight evenly? If I do install that chassis on my TA01, will it be converted to a TA02? My destiny lies in your hands.

EDDIE HWANG

APO 96204-0019

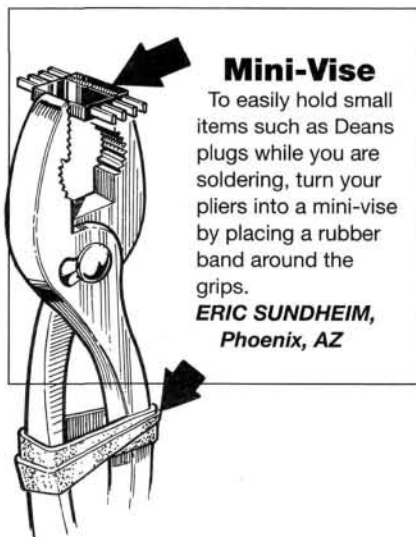
Guess what, Eddie? The tricked-out chassis you saw in Chris's "Back Lot" is a TA01 just like yours; well, maybe not just like yours, but probably what you'd want yours to look like. The chassis is made by Hobby Products Intl. (no. 8020). Although the chassis was designed for the TA02, it can be bolted right onto your TA01 without any modifications. The chassis is designed to distribute the weight of the battery closer to the chassis centerline, but it will not turn your car into a TA02. For more info, give HPI a call at (714) 837-3250, or contact your local hobby shop.





PIT TIPS

by Jim Newman



Mini-Vise

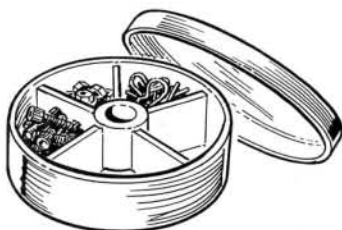
To easily hold small items such as Deans plugs while you are soldering, turn your pliers into a mini-vise by placing a rubber band around the grips.

ERIC SUNDHEIM,
Phoenix, AZ

Divide and Stack

To carry small parts, use plastic containers made to hold fishing weights and lures. For convenient storage, the containers can be stacked on a dowel.

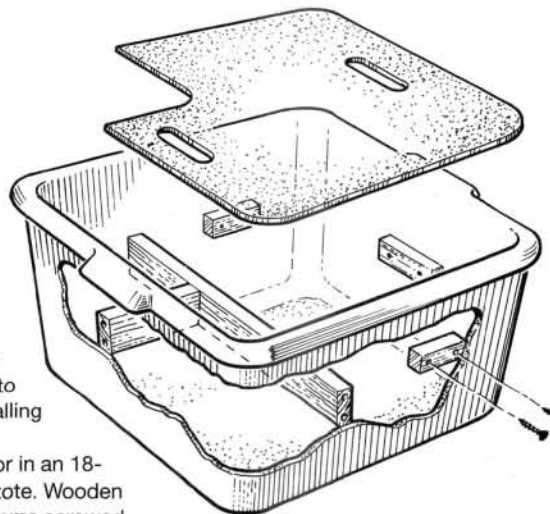
JACOB RILEY, Brookville, OH



Two-Level Tote

Minimize trips from your car to the pit by installing a removable Masonite® floor in an 18-gallon plastic tote. Wooden blocks and beams screwed through the walls provide support for the floor. Tools and spare parts go inside the tote, and the car travels on top. A cut-out in the corner allows the fuel jug to stand upright.

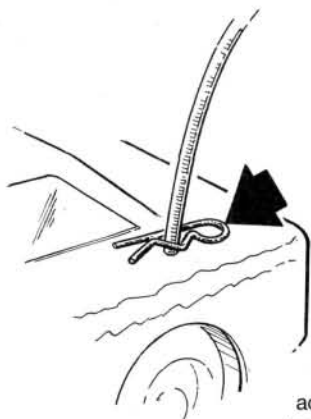
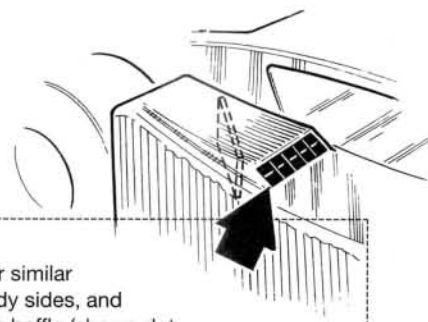
ANDREW JENNINGS, Clovis, NM



Extra Cooling

To take in extra cooling air on the Turbo Mirage or similar bodies, cut open the bumps on the top of the body sides, and glue a piece of screen into place. Glue in a plastic baffle (shown dotted) to direct air toward the electrics.

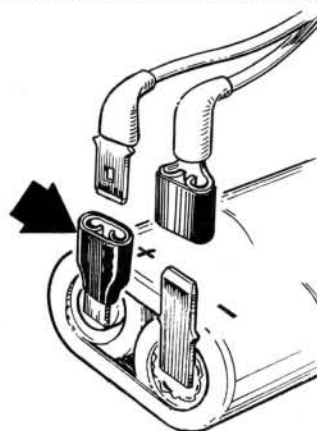
MARK SANTA-INES, Bellflower, CA



Instant-Access Clips

For ready access to a spare body clip, attach a spare one to the base of the antenna tube.

RYAN TANNER, Zion, IL



Battery Quick-Disconnect

Solder spade lugs—available at the auto-parts store—to your Ni-Cd pack, with matching lugs on the wires. Note how, in each case, one lug is heavily insulated to guard against short circuits.

CURTIS BROOKS,
Las Vegas, NV

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



by Brian Leslie

When to Modify

HOW MANY times have you scrutinized the pages of *R/C Car Action* looking for R/C car or truck hop-ups? I do it every month—especially if I'm about to buy a new kit. Before you lay down your hard-earned cash for a kit, it's always a good idea to check the availability of hop-ups. It's important to buy a kit that can be "expanded" as your skills grow.

A few years ago, upgrades were very important in this respect, but

modify my car or truck?

Well, modifying and upgrading can bring very definite advantages for:

- **Durability.** If the car is broke you ain't driving it!
- **Run times.** If you have to charge batteries every 3 minutes, again, you aren't driving it.
- **Performance.** Certain items will help your vehicle handle better and go faster.

WHERE DO YOU START?

Every kit has weak points. When I say "weak point," I don't mean defect. I'm referring to a part that does the job it was intended to do but could do it better if it were made out of a different material or had a slightly different design.

Most manufacturers, and many aftermarket companies, offer upgrades for potential weak points.

What are weak points? Well, every entry-level kit has them. They're what allow manufacturers to sell their products at entry-level prices for beginners. Let's look at some common weak points and how they can be upgraded, in order of importance.

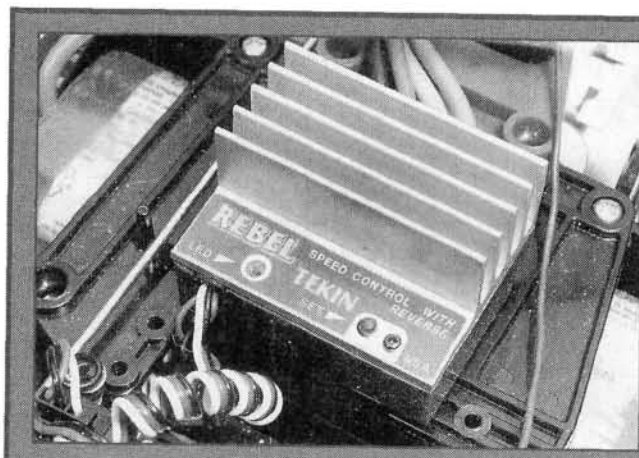
technology has now catapulted the industry to unbelievable heights. Many manufacturers produce R/C kits that can win national events right out of the box, and they're cheaper than their predecessors. So the question is when and why should I

...modifying and upgrading can bring very definite advantages for...
**Durability...Run times...
Performance.**



Connectors

By far the cheapest upgrade is swapping your stock, Tamiya- and bullet-style connectors for high-performance connectors. The connection in these types of plug is poor at best; it has way too much resistance, which creates heat and wastes power. Using high-performance connectors such as those made by Deans*, AstroFlight*, and Litespeed/Sermos* is nearly as good as soldering the wires directly to your motor or battery pack terminals.



Speed Control

Entry-level kits usually have mechanical speed controls—the rotary type or the resistor/wiper type. The single most worthwhile upgrade is to replace your stock mechanical unit with an electronic speed control (ESC). ESCs offer smooth power delivery and braking and additional control, and that means improved driving capabilities, longer run times and *serious* speed. Most of all, ESCs are more reliable than mechanical controllers and, unlike the latter, they hardly ever break down or require maintenance.

QUESTIONS & ANSWERS

Q I've noticed that some racers outline their cars' doors, hoods and windshields in black to make them look realistic. How is this done? Is it paint?

A No, it isn't usually paint; it might be permanent marker or tape, which is available in many widths to suit any application. Trinity* and Parma* sell body-marking pens; Pactra* and Coverite* make colored trim tape.

Q Whenever I see an on-road car with a NASCAR body in *Car Action*, it has a full set of decals just like the full-size NASCAR racers. How can I get a set?

A Autographics* and Parma are on the leading edge of decal-sheet production, and they have all you need to make your R/C NASCAR look just like the big boys.

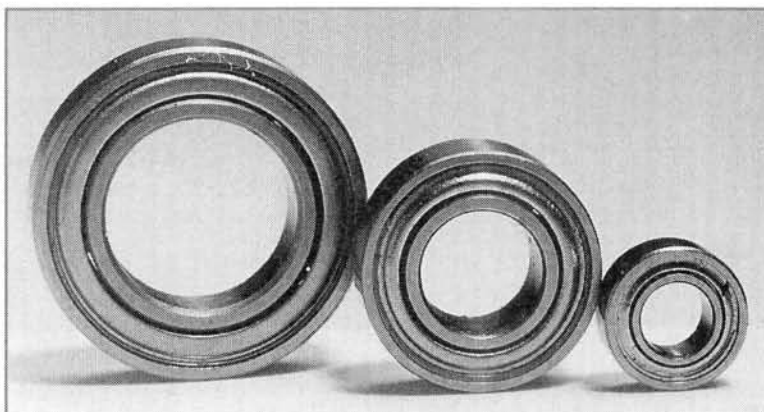
Q It seems that the first modification to a kit is always to swap the bushings for bearings. Should this be first, or is an ESC more important?

A Good question! It's really a matter of preference; they cost about the same, especially if you're buying bearings for an off-road machine. I'd go for the ESC first. Here's why: an ESC will make driving much more fun and will increase run times instantly. Bearings will increase run time, but they won't make the car easier to drive (an ESC will). Second, you can buy bearings one set at a time; replace the tranny bearings one month, then the front wheel bearings, etc., as your budget allows. Spread the cost to ease the cash burden.

Q At a recent indoor carpet race, I noticed that all the racers put "stuff" on their tires and wiped it off before each race. What is this stuff?

A It's traction compound, which softens foam tires to make them stick to the track and give you unbelievably great traction. Many racers have their own concoctions that may include Tabasco sauce, heavy water and who knows what else! But they sometimes get too much traction and wear out their tires a little sooner than they'd like!

There are no rules for using traction compound. Because tracks vary, at any one, I always find a track regular who's running well and ask what he/she uses; I experiment from there. Check out the excellent traction compounds made by Trinity and Paragon*.



Bushings to bearings

Entry-level kits all have one thing in common: no ball bearings. Instead, they usually have bronze Oilite bushings or plastic bushings (worse) to support the axles, wheels and transmission gears. What's wrong with bushings? They create friction, which creates drag, which wastes power and slows the car and, worst of all, kills run time.

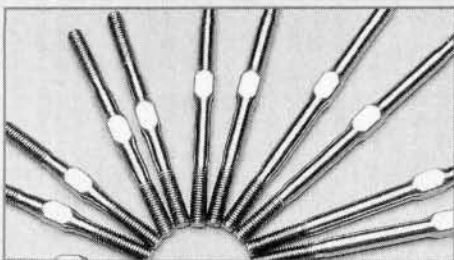
Bearings are almost friction-free, so the wheels and gears can spin freely. They offer the benefits of longer run times, higher speeds, smoother handling and durability. With proper maintenance, a set of bearings will last the life of a model.



Hard-anodized shocks

In these, the aluminum-body shock reservoirs have been specially anodized and in many cases coated with Teflon™—a process that makes the shock body last longer and produces smoother damping. Only the "Team" versions and top-of-the-line kits come with hard-anodized shocks. But this type of shock may fit many kinds of other trucks and buggies; check with your hobby dealer.

Tie rods and upper control rods



On the suspensions of some beginner kits, the tie rods and control rods are of a fixed length, and they might even be made of plastic. More advanced kits have threaded-steel rods or turnbuckles. Obviously, plastic is not what you want to hold your steering and suspension components in place, but believe it or not, steel isn't the best either. Plastic breaks too easily and wears out too fast; steel bends too easily then breaks eventually. Tecnacraft* and Lunsford Racing* make titanium tie rods that are far stronger yet much lighter than steel, and for off-road, titanium tie rods are one of the most popular upgrades.

If you need to go any further than making these upgrades, I suggest you save your pennies for a kit that may already have all the upgrades you want. Some kits can only be upgraded so far before it's time to call it quits and move up to a more advanced kit.

*Addresses are listed alphabetically in the Index of Manufacturers on page 184. ■



by John Rist

Novak Tempest

BACK IN 1990, among modified-class racers, the king of the hill was the Novak* T-1X ESC—a bruiser that had 12 FETs and an advertised resistance of 0.0015 ohm. In 1993, Novak achieved the same resistance using only five FETs—a quantum leap made possible by the availability of low-resistance FETs. That year, the HyperFET FET became available, and with these nifty little transistors, Novak achieved a “Scoping Out”-measured resistance of 0.0025 ohm with five FETs.

Enter the Tempest, which sports not five but six of the HyperFET II FETs, plus three for brakes (see “What it Has” box).

High-frequency motor control is still probably the single greatest improvement in ESCs since they were introduced. When racers first started to use ESCs instead of servo-driven variable-resistance speed controls, they also started to experience premature motor failure. Motors got extremely hot, especially when used on roadcourses where the throttle was used a lot.

WHAT IT HAS

- 9 HyperFETs (6 for forward, 3 for braking).
- Massive 12AWG battery and motor leads.
- High-frequency motor drive.
- One-Touch Set-Up™.
- Built-in pulse-checking LED.
- Current limit (20 to 80 amps plus “off”).
- Radio priority (prevents loss of steering when the battery dumps).
- Digital anti-glitch circuitry.
- Universal receiver plug system.
- 6V BEC.

And Novak supplies an instruction sheet, motor capacitors, a Schottky diode, setup button-push tool, mounting tape and killer decals.

Engineering analysis showed that the motor heating was caused by the AC component that the new ESCs were generating with their 50 to 60Hz switching action. Our R/C car motors run on DC, so any AC component feed to the motor doesn’t produce mechanical energy but shows up as heat. The modern high-frequency (HF) control switches at 2500Hz—a frequency that’s high enough for the motor inductance to smooth out the AC component and make it seem to be DC voltage. With the AC dealt with, so is the overheating—gone! If you want to read more on the theory behind HF speed controls, get AstroFlight’s* “Electric Motor Handbook.”

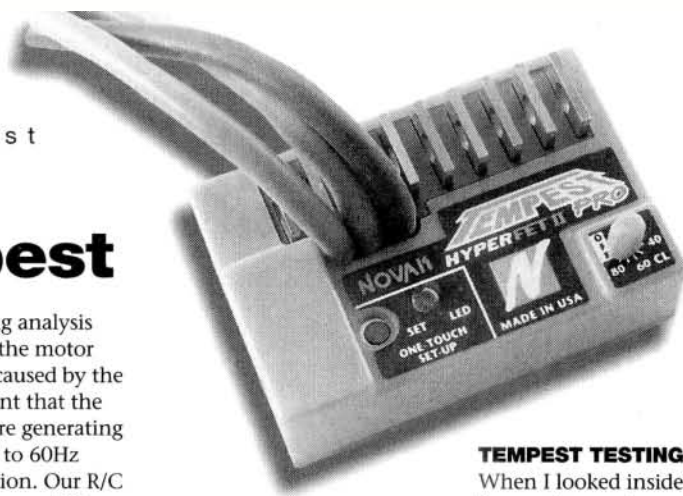
Also placing the Tempest in the top pro category is its “punch control.” With a twist of a knob that’s labeled “20 through 80” and “Off,” you can adjust the maximum current flow. When an R/C vehicle is stationary and you punch the throttle, for a brief moment, the current flow goes ballistic. This is because, until the motor gets up to speed, you get locked rotor current. When a motor isn’t turning, there isn’t any back voltage to limit the current flow. The limiting factor becomes the resistance of the wire in the armature. Because we use motors that have large wire and few turns, this resistance is very low. Because of this, current can jump to 90 to 100 amps in a heartbeat. This tremendous current surge generates tons of wheel-spinning punch—fine, if you’re trying to impress your friends. But on a slippery track, this

over-powering just makes your car head in the wrong direction and waste power. By simply limiting the Tempest ESC’s maximum current, you can find a setting that controls wheel spin but does not affect maximum speed.

The One-Touch Set-Up™ might seem to be just a frill, but it means that there’s a microprocessor on board—an on-board computer that not only takes care of the “One-Touch,” but also helps to provide a very linear, silky-smooth throttle response, which is especially important at slower speeds. It also ensures that you have complete steering control all the way down to a full dump—a feature Novak calls “radio priority.”

The microprocessor also provides the Tempest’s digital anti-glitch circuitry. It looks at the signal coming from the transmitter and decides what is signal and what is noise. In this manner, a lot of the unexplained radio “hits” that one has experienced in the past may simply go away when the Tempest is installed in a car.

The Tempest’s massive motor and battery wires are impressive, and there aren’t any connectors installed on their ends—a clue that the Tempest is clearly intended for serious racers who either hard-wire their equipment or use pro-quality connectors such as those made by Litespeed* and Deans*.



TEMPEST TESTING

When I looked inside the Tempest’s case, I saw what I always expect to see in a Novak ESC—great-looking innards. One printed-circuit board takes care of the microprocessor, and another handles the high current. Unique to the Tempest is the exit point of the motor and battery wires—near the center of the case, right at the junction of the brake and forward FETs. This permits a very short, low-resistance connection to the FETs.

Installing the Tempest in my “Scoping Out” test setup was extremely easy. I use my Pit Stop radio to control an ESC while I test it. This is nothing more than a servo tester that puts out the same signal as a receiver. With the motor wires connected to my resistor load bank and the battery wires connected to my bench supply, I simply pushed the program button on the Tempest and rotated the control on my Pit Stop Radio from forward to brake and back to neutral. I then checked the accuracy of the setup with my oscilloscope and found it had been set correctly. I like my throttle to arrive at full “on” at about the 80-percent point, and this is precisely the setting provided by the One-Touch.

TEST 1—RESISTANCE

With the Tempest installed and running (very easy because of the One-Touch Set-Up™), it was time to test the Tempest’s resistance.

With 12 amps of current flowing, I measure the



SPECIFICATIONS

DIMENSIONS

Height0.785 in.
Width.....1.35 in.
Length2.60 in.
Weight with wires2.6 oz.

TUNING

Access to controlsExcellent
Ease of adjustment. Excellent

PRICE

List price/warranty ..\$199/90 days

MANUFACTURER'S SPECS

Max. voltage10 cells
Min. voltage4 cells
Rated current420 amps
Resistance0.00116 ohm

TEST PARAMETERS

Voltage.....6 volts
Current12 amps

• Voltage drop

—along full length
of wires0.05 volt
—2 inches
along wires.....0.03 volt

• Resistance*

—along full length
of wires0.0041 ohm
—2 inches
along wires0.0025 ohm

BEC output,
6-cell battery5.89 volts

*Resistance = Voltage drop ÷ Current

COMMENTS: once again, Novak has introduced a world-class racing speed control. It has the smoothest motor control, lowest voltage drop, highest current rating and coolest operation—period!

voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

• Voltage drop along the full length of the battery wires and motor wires: 0.05 volt—a resistance of 0.004 ohm.

• Voltage drop 2 inches along the wires: 0.03 volt—a resistance of 0.0025 ohm (amazing!).

This is about as low as ESC resistance gets. The Tempest has world-class, pro-quality low resistance.

TEST 2—OVERHEATING

I "cook" every controller I test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps.

The Tempest does not come with a heat sink, but Novak's "Polar Drive" supposedly keeps the FETs so cool that they don't need one. Of course, with six HyperFETs in parallel and a low resistance, you simply wouldn't expect any overheating.

I set the throttle to wide open and checked the FETs

SERPENT IMPACT WORLD CHALLENGE

SERPENT USA invites you to join and to compete in one of the US regional rounds of the SERPENT IMPACT WORLD CHALLENGE 1996. Regional qualifiers will earn the right

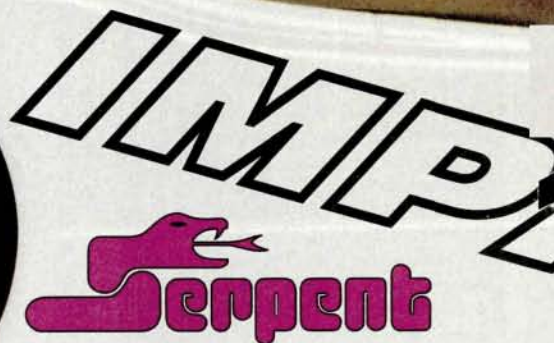
to compete in the USA GRAND FINALS held in Miami, Florida.

Take part in this exciting competition and enjoy 1/10 scale gas on-road racing at its best.

The GRAND FINAL winner and one lucky entrant (by drawing) will travel to Europe as SERPENT USA's guest to compete in the IMPACT WORLD FINALS!



Competition open to all Serpent IMPACT cars and Serpent MEGA engines only. ROAR and EFRA rules apply. Call or fax for rules and entry forms.



IFMAR WORLD CHAMPION 95/96

WIN YOUR WAY TO THE WORLD FINALS IN EUROPE*

* non sponsored drivers only

SERPENT, performance through quality

contact us at:
or you local dealer

after 15 minutes; their temperature rise was insignificant. The Tempest could handle 20 amps indefinitely without working up a sweat. Even the hottest wound modified motors should work well with it.

I upped the current to 35 amps—the level at which a 1800mAh battery pack would dump in about 3 minutes. After 5 minutes, the FETs were warm, but I could still touch them. What does this mean? If you keep run times to around 3 minutes, the Tempest doesn't need a heat sink. If your favorite dumps in 1 minute, the Tempest will probably still work well, but you should add heat sinks. (Just remember that if you short the six running FETs to the three braking FETs while

doing this, you'll destroy the controller.)

TRUCKIN' THE TEMPEST

The instruction sheet is well-written, and for those with experience, there's a short section that tells you all you need to know to get a car running. The step-by-step section includes *full* details.

I generally run a stock motor in my MRC MT-10S truck, but it seemed a little lame for this, so I chose a hot Trinity* Team Kinwald modified motor. With the MRC MT-10S's stock gearing (a little tall, but I wanted to push the Tempest to its limit), I headed out for some fun.

When I nailed the throttle, the truck exploded forward and the throttle response was so smooth

that, even though it was overpowered, the truck was still very controllable. I drove the Tempest to a complete battery dump, and I never lost steering. The truck simply ran more and more slowly. Even under the load of a wild modified motor, the truck's forward motion kept the Tempest cool—totally cool.

Up until now, the current-limit feature had been in the "Off" mode, but with a simple twist of the knob, I reduced the current available. At the 20A setting, acceleration was wimpy, and I'm reasonably sure that top-end speed also suffered. At 40 amps, acceleration and top speed were again very good, but I didn't have to be as careful with the throttle to avoid wheel-spin. At 80 amps, there's very little difference

(if any) between this setting and "off." With this range of control and ease of operation, the Tempest may be matched to any track condition, and it will win races. As Novak's top-of-the-line offering, it will wind up in the hands of top professionals and amateurs all across the nation. Its resistance was as low as any I've ever tested, and heat sinks would only be necessary if you ran the Tempest with several modified motors in a monster truck that has a 2 minute run time on an 1800mAh pack.

The Tempest won't be the least expensive speed control you ever bought, but it will be one of the best.

*Addresses are listed alphabetically in the Index of Manufacturers on page 184. ■

WORLD CHALLENGE 96

USA GRAND FINALS

REGIONAL ROUNDS

MIAMI, FLORIDA NOV. 8-10

Miami, Florida May 17-19

WORLD GRAND FINALS

Mesquite, Tx June 21-23

THE NETHERLANDS

Racine, Wi July 19-21

DECEMBER 13-15

Ontario, Ca August 2-4

Enfield, Ct September 13-15



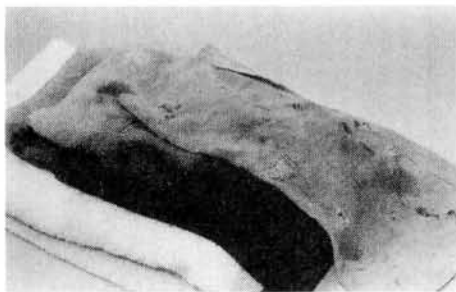
SERPENT Inc. USA West Park Centre 2832 Nw 79th Avenue Miami Florida 33122
 Phone: (305) 639-9665 Fax: (305) 639-9658
 Internet: <http://www.serpent.nl> e-mail: serp-usa@ix.netcom.com



Inside the Doctor's Black Bag

I'M REALLY a pretty lazy racer. The club that I belong to runs on Thursday nights, which means that I go to the track after work. I take a single bag to the track, so that I have to make only one trip from the car to the door. A lot of my fellow club members are amazed at what comes out of that single bag—everything that I need, some spares and enough extra parts to get other drivers out of trouble before the night is over. The bag's contents are the result of years of

racing every week in many different classes. Every so often, I'll dump everything out of the bag, go through the entire mess and decide what to take and what to leave at home. Sometimes I regret the decision I've made, but mostly, I'm satisfied that I can deal with almost every situation I encounter and be able to repair my ride and get back for the following heat without making unnecessary trips to the parts counter. So, what's in the bag?



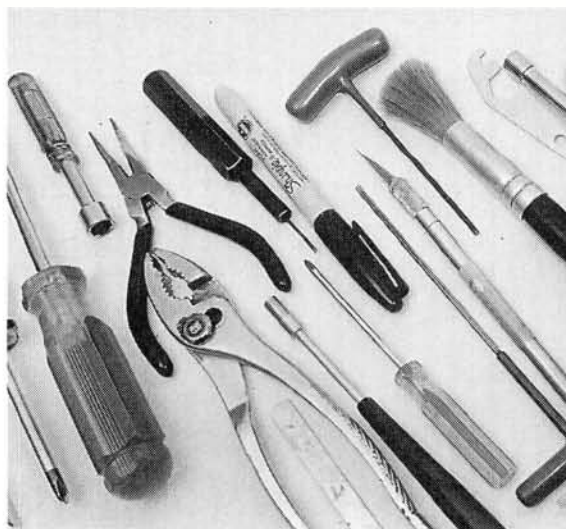
Towels

I always set up my pit on a clean, white, terry-cloth bath towel so that I can see any parts that may fly off the car while I'm working on it. I also take along a yellow terry-cloth hand towel to wipe traction compound or dirt off the car's tires and a small, cotton shop towel to work on

things such as diffs or bearings that might get snagged on the terry-cloth towel. There's a tough plastic bag from a car body that I put the towels in at the end of the day, and they get washed every week. Keep them clean, and a good set of towels will last four or five years.

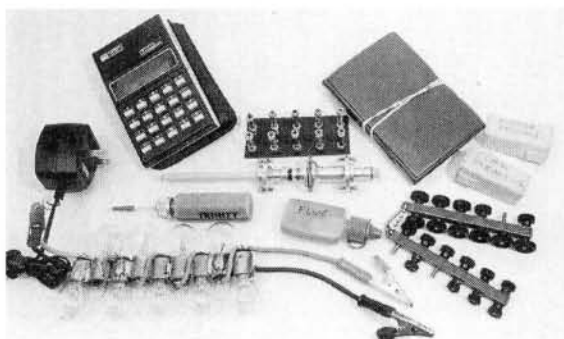
Battery charger, power supply, transmitter, car stand, soldering iron, power strip and fan

Power supplies tend to run hot—even high-quality units like my 10A LAVco*. I keep mine cool with a Radio Shack 110V fan that plugs into my power strip. To keep cool air flowing all around the case, I set it on a pair of bent Lexan V-strips that allow air to run under and over the power supply and my Competition Electronics* Turbocharger. After more than five years of use, this stuff still does the job, along with my Ungar* Race Station soldering iron. All of the electrical gear gets set up along the right side of the pit, out of the way of my main work space. I use a wooden block for a car stand because it gets pretty beaten up, plus I can solder on it. It also keeps wet tires off the towel, and it provides me with a solid work platform.



Tools

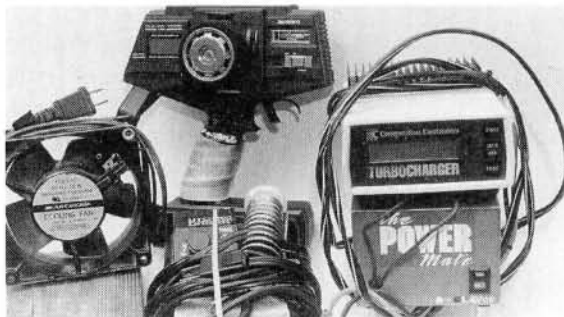
I use the same tools that sit on my workbench and put them in a 6x9-inch plastic food container that has a tight-fitting lid. That way, I don't have to worry about duplicating everything I own. There's just enough space

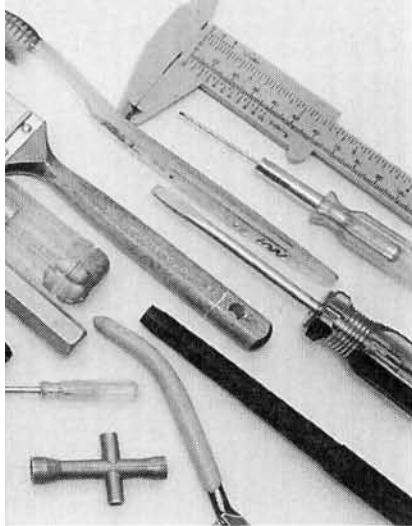


Miscellaneous stuff

A bulb discharger; calculator; voltmeter; motor-cleaning kit; spare crystals; suspension springs; larger spare parts, such as suspension arms and motors; oil; a Dooleybox (see "R/C Doctor," July '95); solder and flux all reside in a plastic container about the size of a small loaf of bread. The contents of this box change according to

which class or chassis I'm running, but most of it goes with me when I go racing. Sometimes, I'll use an identical container to transport alternative truck or buggy tires or several sets of foam tires, while I figure out which compound to run on a new car or track. It keeps the inside of the bag from getting dirty and smelly.





for my collection of pliers, screwdrivers and wrenches. If the lid goes on too easily, I know I've left something behind. Money spent on good tools is money spent wisely. If you

need a special tool to do a job properly, save up your money and buy one. Quality tools are also easier on the screws, nuts and bolts. Take care of them, and you'll enjoy them for a lifetime.

Batteries

I keep my batteries in a tackle box that holds five batteries. These, plus the one already in the car or truck, will get me through a day or night of racing. The box keeps them from bumping against one another and shorting out, which can cause a fire. This is not a good thing. In a pinch, I can put 10-stick packs in one of these boxes, which is good for an entire day of parking-lot racing in two classes. Now, if I only owned 10 battery packs.



Spare parts

I organize small parts, e.g., screws, nuts, diff parts, suspension pins, shock springs and axle nuts, into small-parts boxes that can be found at craft stores, sporting-goods stores (try the fishing department) and through your good friends at Tower

Hobbies*. Each small box has a dozen or so compartments, and I label them according to the race, e.g., Formula 1, metric, SAE and off-road. Depending on what brand or type of car I'm running, I carry at least one box in my bag.

Remember to put a thick rubber band around each box to keep it from popping open and spilling miniature mayhem on the bottom of your bag!



Spare electronics

You can cobble a lot of temporary repairs together, substituting a long screw for a short one, or using a tie-wrap to hold parts together for one more race. If, however, you blow a receiver or speed control, or stuff a servo, your day is done, unless you have a replacement. Eventually, you'll have to either borrow one or have one in the bag. I'd rather not rely on my fellow racers to have the exact same size and brand of equipment that I use, so I always take along spares. Mind you, they're not new ones, but they'll work in a pinch, especially if it's just for a couple of races. This is the kind of stuff that people tend to throw in with a used car or truck, so you may get your spares for free.

Bag

I bought my current bag at a clothing store in an outlet mall for under \$15, but you should be able to find one that's very similar in a luggage or a sporting-goods store for less than 30 bucks. Look for a nylon cordura bag with a hard, reinforced bottom and double zippers on the top; the bags made of parachute material look cool, but they tear too easily. A bag with one main compartment is OK if you put everything into smaller containers as I do; otherwise, look for a bag that has sections. Trinity Products*

and Dirt Bagz* have bags with sectioned-off pockets, and both have plenty of room to hold a car and tools. If the bag gets much larger than 10x24x12 inches, though, you may be tempted to bring along more stuff than you really need. That's no way to be lazy!

So there you have it. You see, you don't have to take your whole arsenal to have a good time at the track.

* Addresses are listed alphabetically in the Index of Manufacturers on page 184.





Losi attacks the gas class

TEAM LOSI GTX

WITH THE INTRODUCTION of their new GTX nitro truck, Team Losi* has helped to further legitimize and strengthen the 1/10-scale gas category. Now, both of the biggest off-road racing companies in the U.S. (Team Losi and Team Associated*) offer 1/10-scale gas trucks in their lineup. Add the fact that there are overseas competitors (Kyosho* and Schumacher*) that also offer nitro-powered race trucks, and you have a hot

category. Does Losi's new GTX have what it takes to be at the front of the pack? Let's take a look.

KIT FEATURES

When Team Losi build a vehicle, they build it to win races. They feel that their newest endeavor, the GTX gas truck, will put the heat to Team Associated's RC10GT and Kyosho's new Nitro Pro ST; Team Losi had several prototypes in the works before they finally decided on the platform you see here.

- **Chassis.** The GTX features an aluminum chassis and an upper, molded-composite "Stiffezell" chassis brace/fuel-tank holder.

When the upper and lower chassis are joined, the top brace forms a "box" chassis design that provides maximum stiffness, but minimal flex.

A user-friendly fuel tank makes pit stops and fill-ups a snap. It's mounted with rubber grommets in the Stiffezell chassis brace, instead of being mounted on the chassis itself. This helps reduce the vibration that the fuel tank is exposed to, and it prevents the fuel from foaming, which, in turn, improves the fuel flow to the carburetor. The "chicken hopper" tank style allows a consistent fuel draw, and it helps eliminate the leaning-out that occurs when the fuel level in the tank becomes low.

A Contender for the lead in the Gas Truck Wars

by JOHN HOWELL

• **Suspension.** The truck uses Team Losi's LX-T suspension arms, front bulkhead, bell-crank steering system and hard-anodized "Hard Body" shocks (Red springs are included for all four shocks). The rear shocks are mounted on the rear of the suspension arm to keep them as far from the engine and header as possible. This helps to prevent the shocks from heating up and altering damping qualities during a race.

• **Transmission.** A ball-bearing-equipped, three-gear, Double-X-style transmission comes equipped with a large idler gear for added durability. The top shaft spins a standard 32-pitch, 76-tooth spur gear that is mated to an 18-tooth pinion/clutch bell

SPECIFICATIONS

SCALE 1/10
LIST PRICE \$589.95

DIMENSIONS

Length (overall) 16.75 in.
Wheelbase 11.5 in.
Width (F/R) 12.5 / 12.25 in.

WEIGHT (gross, RTR) 3 lb., 13 oz.

DRIVE TRAIN

Type Sealed gearbox
Primary Pinion/spur
Transmission Universal-joint
drive shafts
Differential(s) Ball
Slipper clutch Adjustable friction-type
Bearings/bushings Bearings

CHASSIS

Type Aluminum plate with
molded upper "box"
Material Aluminum/Stifzell

SUSPENSION (F/R) Independent A-arm
w/upper camber link
Damping Coil-over, oil-filled shocks

WHEELS (F/R)

Type One-piece plastic
Dimensions (DxW) 2.2 x 2

TIRES

Front Ribbed (HT compound)
Rear Mini-pins (Gold compound)

POWERPLANT

Engine TNT .12R
(pipe, carb and header included)

Kinwald's GTX



In its very first race, the GTX proved itself a worthy opponent. At the West Coast Gas Challenge in Hemet, CA, Team Trinity/Team Losi driver Brian Kinwald took the win in the truck A-Main with his freshly prepped GTX ("freshly prepped" meaning he had only one day of practice with it before the race; he had built it the night before). In fact, this race was the first time Brian had ever driven a GTX! Not too shabby for its first outing. After the race, Brian told me that "the GTX works really well and is a very stable truck. I'm happy with its performance."

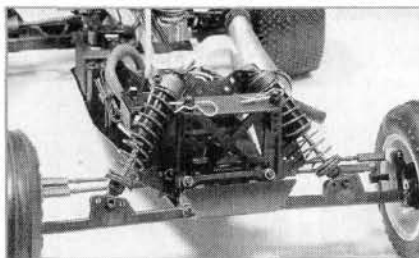
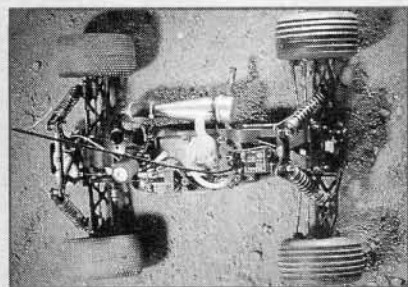
"I recommend that people try the Hydra Drive on really bumpy tracks. The people who were running them said they helped. I didn't really have the time to mess with the Hydra Drive, though. I was pretty busy working on my other setups. I didn't have much time to get the truck 100-percent dialed in the way I would have liked. I didn't want to slap on a Hydra Drive going into the Main without knowing how the truck would react."

"I'd also recommend that you try running the body with a wing on it. A few people at Hemet weren't running wings, but I found it helped quite a bit."

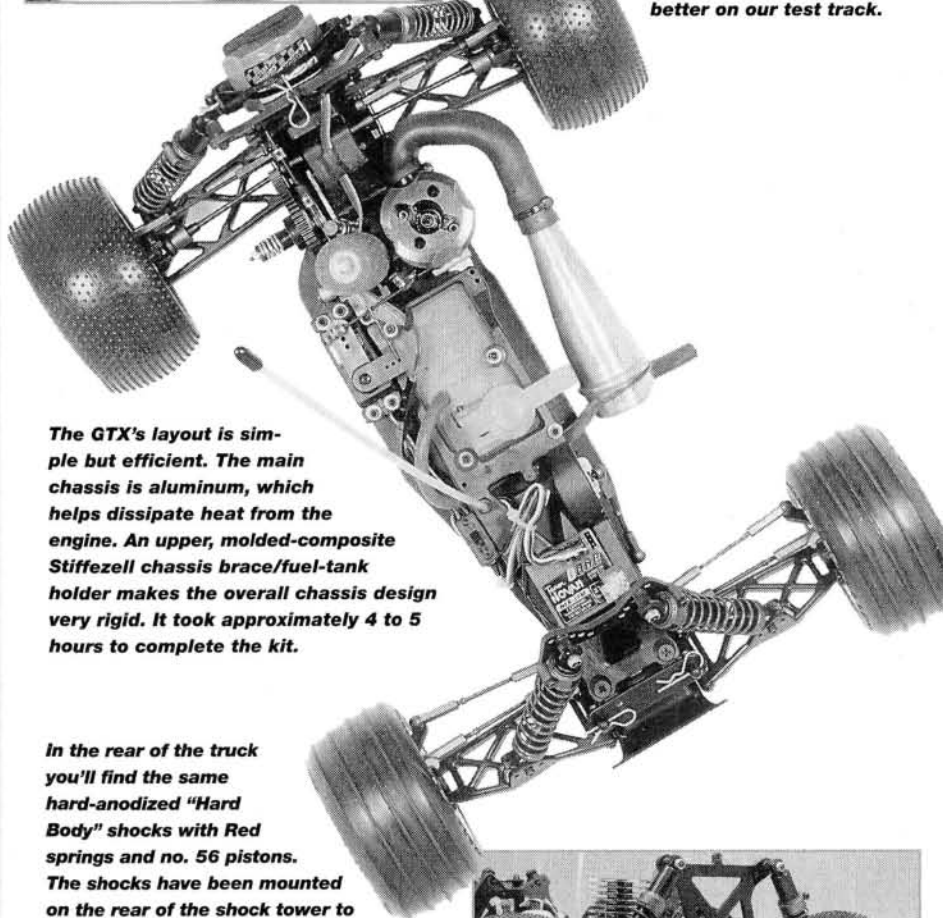
So how did Brian set up his truck? He sent us his ride right after he took it off the track.

KINWALD'S WINNING SETUP

- Rear shocks—Pink springs, 30WT silicone oil and 5-6-6 pistons.
- Front shocks—Red springs, 30WT silicone oil and 56 pistons.
- Futaba 3-channel FM receiver.
- Airtronics 94155 steering servo.
- Airtronics 94151 throttle servo.
- O.S. CZ-Z engine.
- Graphite-composite center-chassis brace.
- Lunsford titanium turnbuckles.
- Team Losi directional front tires (Silver compound).
- Team Losi IFMAR pin rear tires (Silver compound).
- Front camber—2 degrees.
- Rear camber—1 degree.

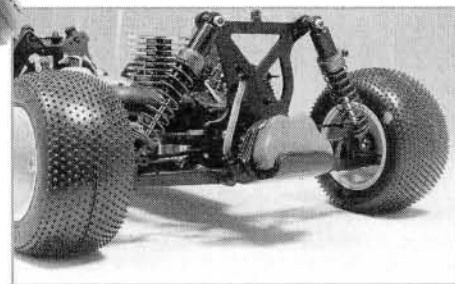


The GTX front end has the same winning technology as Team Losi's proven LX-T. Hard-anodized "Hard Body" shocks provide the damping up front with stock Red springs and no. 56 pistons. I replaced the stock kit's Gold-compound front tires with Silver-compound ribbed tires, which hooked up better on our test track.



The GTX's layout is simple but efficient. The main chassis is aluminum, which helps dissipate heat from the engine. An upper, molded-composite Stiffezell chassis brace/fuel-tank holder makes the overall chassis design very rigid. It took approximately 4 to 5 hours to complete the kit.

In the rear of the truck you'll find the same hard-anodized "Hard Body" shocks with Red springs and no. 56 pistons. The shocks have been mounted on the rear of the shock tower to keep them away from the engine. (Engine heat could alter the viscosity of the oil in the shocks, and that would alter damping.) The receiver pack is mounted in the rear of the truck for better weight distribution, which helps handling. I replaced the stock kit's tires with Silver-compound IFMAR pin tires.



THE COMPETITION

	Team Associated RC10GT	Kyosho Outlaw Rampage Pro Team	Team Losi GTX	Schumacher Nitro Storm 2000
Wheelbase	11.1 in.	10.9 in.	11.5 in.	11.25 in.
Width	12.25 in.	12.2 in.	12.5 in.	12.75 in.
Weight	4 lb., 0/3 oz.	4.1 lb.	3 lb., 13 oz.	4 lb.
Diff type	Ball	Ball	Ball	Ball
Brakes	Single disk	Drum	Drum	Disk
Exhaust	Included	Included	Included	Not Included
Price	\$625 (w/ engine)	\$399.99 (w/out engine)	\$589.95	n/a
Available at*	\$333.99	\$219.99 (w/out engine)	\$344.99	\$221.70
Issue reviewed	5/94	11/94**	6/96	11/94**

*Prices vary with location. **See "Pick Your Nitro Truck."

(clutch-bell/spur-gear sets are available for additional gear-ratio changes).

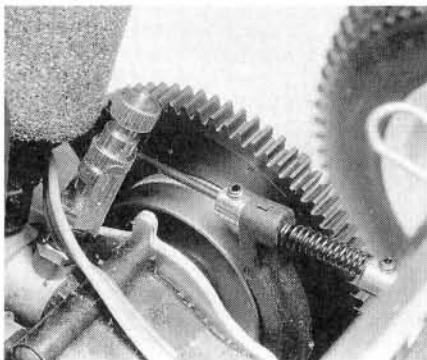
• **Brakes.** Mounted on the top shaft is a drum-brake and slipper unit (the slipper shaft/slipper assembly will accept a Hydra Drive unit). According to Team Losi, the drum-brake system was designed to geometrical perfection, and that makes for smooth braking. Braking is proportional to trigger position—when you give it a little brake, you get a little brake; give it a lot of brake, and the truck stops in a hurry.

• **Engine.** Included with our review kit was the new Dynamite* TNT .12R engine—an update of the TNT .12. The .12R has a new super rod, a super-seal front bearing and an O-ring-sealed, low-speed needle that has a new taper and needle shape that gives the engine a more linear midrange without loading up. The O-ring stops air from getting past this critical junction. Overall, the .12R has improved performance and higher reliability, and it's easier to adjust than its predecessor.

• **Engine mount.** A stationary engine-mounting position keeps the chassis stiffer by eliminating the need for slots or extra holes for gear-mesh adjustment. Once the engine has been bolted into place, it also doubles as a chassis stiffener. Universal engine mounts accept all popular .12-size-engines—both pull-start and non-pull-start. The non-pull-start engines are mounted on lower-profile blocks to improve the trucks' overall handling.

Other features to note are:

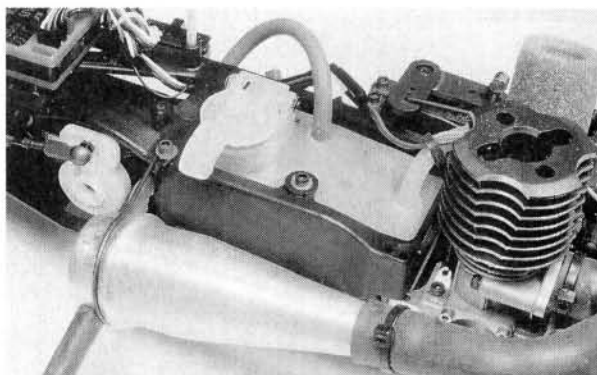
- A dual-stage air filter that prevents dirt from entering the engine.
- A dual-spring clutch that allows easy idle, with no clutch drag; quick engagement helps get the truck over the jumps.
- A throttle-return spring is part of the standard linkage. If your radio glitches and loses the radio signal, the spring will return the carburetor to the idle position to prevent "runaways."



A smooth drum brake gives proportional braking action. Grab a little brake and you get a little brake; grab a lot of brake and the truck stops quickly.

• A rubber header, which won't bend in a crash, and an aluminum tuned pipe are included. A piece of rubber tubing that exits the pipe is used as a stinger. It has advantages over an aluminum extension: to kill an engine with a rubber stinger, all you have to do is pinch it closed; it won't pack up with dirt if it hits the ground; and you can't burn yourself on it.

• Ball bearings and LX-T wheels are included, as is a full set of Losi HT-compound, ribbed front tires and Gold mini-pins.



The fuel tank is mounted on rubber grommets above the main aluminum chassis in the center of the molded-composite chassis brace. This helps to minimize tank vibration, which can "foam" the fuel. A rubber header is included with the kit, as is the aluminum tuned pipe. A rubber stinger exits the pipe and makes stopping the engine easy; just pinch the stinger together, and you kill the engine.

Building & Setup Tips



this is the hot setup for you. The only draw-

back is that when the clutch shoes are in the leading configuration, the truck's handling isn't as forgiving on a really rough and bumpy track.

• Install the header flange on the engine before you bolt the engine onto the chassis. Although the directions tell you to install the flange after the engine has been bolted into place, it's hard to get to the two screws once it's in.

• Put fuel tubing around the pipe-mount bracket. Not only does this secure the pipe better, but it also keeps the bracket from scuffing and scratching the pipe.

• Electric-to-gas crossover racers, beware! Keep an eye on the diff, and make sure it's always tight and is not slipping. In an electric vehicle, you'll know whether your diff is too loose as soon as you nail the throttle because an electric motor produces its greatest torque from 0rpm. On the GTX, the engine has to build up the revs before the clutch engages, which, in turn, gets the power to the diff. If your diff is too loose with that

much power coming from the engine, you'll smoke it almost instantly.

• Don't overtighten the screws that go into the O-rings on the steering and throttle servo or those that go through grommets and hold the gas tank in place. If you overtighten and lock them, you'll defeat the purpose of the vibration-damping grommets and O-rings.

• Don't forget your thread-lock when you build a gas-powered vehicle. Add a drop of ole blue to those metal-to-metal contact areas!

Setup tips from Jack Johnson at Team Losi:

- 5-6-6 shock pistons in the rear shocks (these are standard 56 pistons in which one hole has been drilled using a no. 55 drill bit).
- 35WT oil in all four shocks.
- Red springs on all four shocks (Pink springs if it's a really bumpy track).
- Directional front tires (Silver compound).
- IFMAR pin rear tires (Silver compound).
- 1 or 2 degrees of negative camber all the way around.
- When using a non-pull-start engine, an A-Main Racing or Team Associated header helps quiet the truck a little.

TEAM LOSI GTX

TEST GEAR

To get the GTX up and running, here's what I used:

- Dynamite 20 percent Blue Thunder fuel.
- Dynamite Pro Start starter box.
- Dynamite fuel bottle.
- Dynamite Power Pack 600 AE receiver pack.
- Du-Bro* glow igniter.
- Novak* NER-3FM 27MHz receiver.
- 2 Futaba* 9402 servos.
- JR* 756 PCM radio (27MHz).

PERFORMANCE

It wasn't too difficult to convince the owners of Long Island Raceway—an indoor, off-road, dirt track—to let us test the new Team Losi GTX gas truck there. How much smoke and carnage could one lone gas truck cause? Well, lots of smoke, but tolerable carnage, considering the circumstances—sub-freezing East Coast weather, snow-covered ground and few indoor tracks within reasonable driving distance.

THINGS YOU'LL NEED

- Paint for the Lexan body.

- Radio with two servos that each have at least 40 ounces of torque.

- Hand-held starter or starter box (if engine is not equipped with pull-starter).

- Glow igniter.

- Receiver pack.

- Fuel.

Factory Options

- Graphite front-suspension arms—part no. LOSA1019.

- Graphite rear-suspension arms—LOSA2042.

- Rear-suspension mount set—LOSA2036.

- Graphite transmission-case set—LOSA3085.

- Graphite center-chassis brace—LOSA4023.

- 19-tooth clutch bell with 75-tooth spur gear—LOSA9378.

- 20-tooth clutch bell with 74-tooth spur gear—LOSA9379.

- Graphite brake arm with pad—LOSA9402.

Oh, yeah; it was fast approaching deadline time, too!

Frank Masi and I, plus our "helper," Sean Cilbrith, arrived at the track early on a Friday afternoon to get the GTX sorted and running. After a radio check to ensure that all of the servos and linkages had been correctly set, we bolted on some "beater" tires and headed out to the back of the L.I. Raceway building to set the Dynamite engine's carb and to run a few tanks on the pavement.

Following the instructions from the kit's video, I adjusted both the high- and low-end needle valves to produce a rich setting; then I gave the engine a few bumps against the wheel of my Dynamite starter box to prime the carb with fuel. Placing the glow-igniter over the glow plug, I re-bumped the engine, and it sputtered to high-decibel life. I didn't have to fiddle much with the low-end adjustment, but I felt it necessary to richen the high-end mixture just a bit to produce the desired amount of blue smoke from the pipe. This indicates that the engine is getting enough lubrication—critical for break-in.

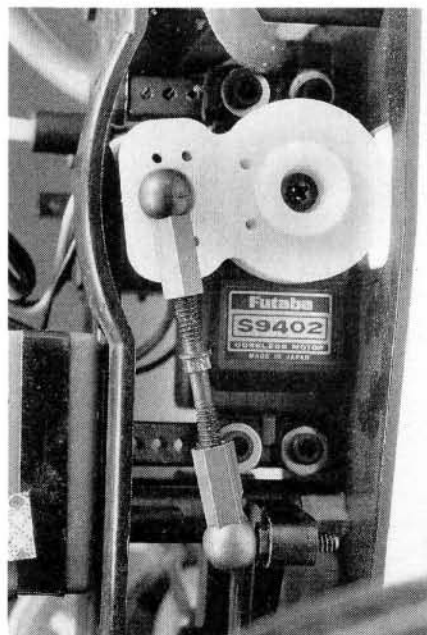
The improvements made to the TNT.12R engine place it head and shoulders above its predecessor. The combination of the super seal front bearing and O-ring-



The GTX comes in a kit version that includes the new Dynamite TNT .12R—an update of the original TNT .12. Its new features include a super rod connecting rod, a super seal front bearing, and a new O-ring-sealed low-speed needle that features a new taper. The engine runs much more smoothly and lasts longer than its predecessor.

sealed low-speed needle greatly reduces air leakage. As a result, it was much easier to tune the engine to produce consistent performance. I ran three full tanks of fuel through the GTX while driving in a wide circle on the empty parking lot. I ran the truck with the body removed so that more air would reach the cylinder head to keep it cool. While it was blipping around, I checked the head temp with a Raytek* infrared probe (it yielded an average reading of about 220 degrees Fahrenheit) and headed inside to test the GTX on the track.

Nothing draws a crowd like the sound of a nitro engine blurring to life at an indoor, electric track! I headed up to the



For both steering and throttle/brake duties, I used Futaba S9402 servos. These new servos feature 111 oz.-in. of torque and a transit speed of 0.10 second/60 degrees.



LIKES

- Kit parts are of the highest Losi standard.
- Simple design is easy to work on.
- Weight distribution doesn't change, regardless of fuel level.
- Servo mounts and linkages are easy to set up.
- Comes with a cool informational video.



DISLIKES

- I can't really say that I love the body.
- "Perfect Mesh" gear-mesh setup still needs minor improvement (see "Building & Setup Tips").

drivers' stand as Frank plopped the GTX onto the main straight. Although still slightly rich, the engine produced acceptable "oomph" off the line, and it quickly reached max rpm. Its speed was definitely on a par with the fastest of the electric trucks with which I shared the track.

The GTX took well to the large, sweeping turn that followed the long straight, and it made short

All the engineering that went into making the GTX's balance is evident in the way it jumps—in a very flat and stable manner...



"single-single!" All the engineering that went into making the GTX's balance is evident in the way it jumps—in a very flat and stable manner, much like an electric truck. Because the fuel tank is centralized, this balance won't be upset too much as the fuel level drops.

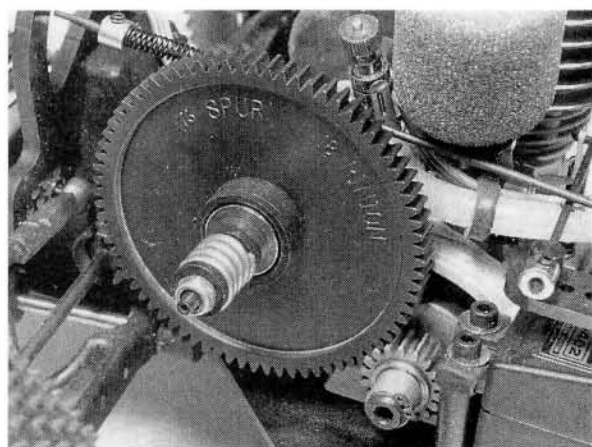
I can best describe the handling of the GTX as being very close to that of an electric truck. If it weren't for the sound of the engine and the sight of the smoke, you would be hard-pressed to tell the difference. Because of the powerband of a glow-engine, however, it can be tricky to get on the gas when the GTX exits a turn. But once you've mastered the throttle control and the engine's powerband, wheelspin ceases to be a big problem.

The stock setup worked very well; to race on a smooth track such as the test track I was on, I would, however, install some travel limiters in the shocks. For bumpier surfaces, the stock setup should be ideal, although I think that slightly softer, Pink springs would help traction and stability in the *really* rough stuff.

FINAL THOUGHTS

The GTX is an excellent performer right out of the box. Team Losi took their time and designed this truck the right way. If you're a veteran electric racer who's looking to step into the world of gas racing, consider this truck. It has the makings of a contender for the lead in the gas-truck wars. Only time will tell which truck is going to come out on top; as it stands, Team Losi has entered the segment with a truck to be reckoned with.

**Addresses are listed alphabetically in the Index of Manufacturers on page 184.*



Beefy, 32-pitch gears are included with the kit. A feature unique to the GTX is that it will accept Team Losi's Hydra Drive traction-control unit. Even though the kit is supposed to have a perfectly set gear mesh, I found a way to tighten or loosen it by adjusting the way the motor is mounted on the engine blocks.

work of the small, double jump that came next. If you're used to driving electrics, get used to the notion of using brakes in almost every turn! Unless you dial-in some drag-brake, i.e., set the brake trim so that the brake is always at least slightly engaged when you let off the gas, you'll need to apply brakes in order to slow enough to take the right lines. I don't like to use the drag-brake method because it tends to make the truck oversteer when I let off the throttle to take a fast turn.

After negotiating a tight, left-hand "carousel" turn and a long, sweeping right festooned with moguls, the GTX showed its talent by handling a difficult drop-off, followed by a hairpin left. When slowed enough, the GTX will turn as tightly as any electric race truck. Next up was the large double jump. Because I don't make this jump very often with a modified electric buggy, I wasn't going to go banzai and risk the GTX's pretty, new Bich'n' Bodies* paint job; so it was

DAHM'S RACING BODIES



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NEW! D218 RAMMER STD™ Fits RC10L, Evolution 10, & Serpent Impact II. Free Spoiler!
D205 RAMMER SS™ Fits RC10LSS



NEW! D221 SPITFIRE™ Fits Low & Tight on the Associated RC10T, RC10T2, Traxxas Rustler & Tamiya Stadium Blitzler. 3-D Side Panels, Front & Rear Spoilers, & Grill Decal.



D056 BUGGSY™ Fits XXT & RC10GT
D080 BUGGSY™ Fits RC10T2 & RC10T
D043 BUGGSY™ Fits 12th Scale Cars



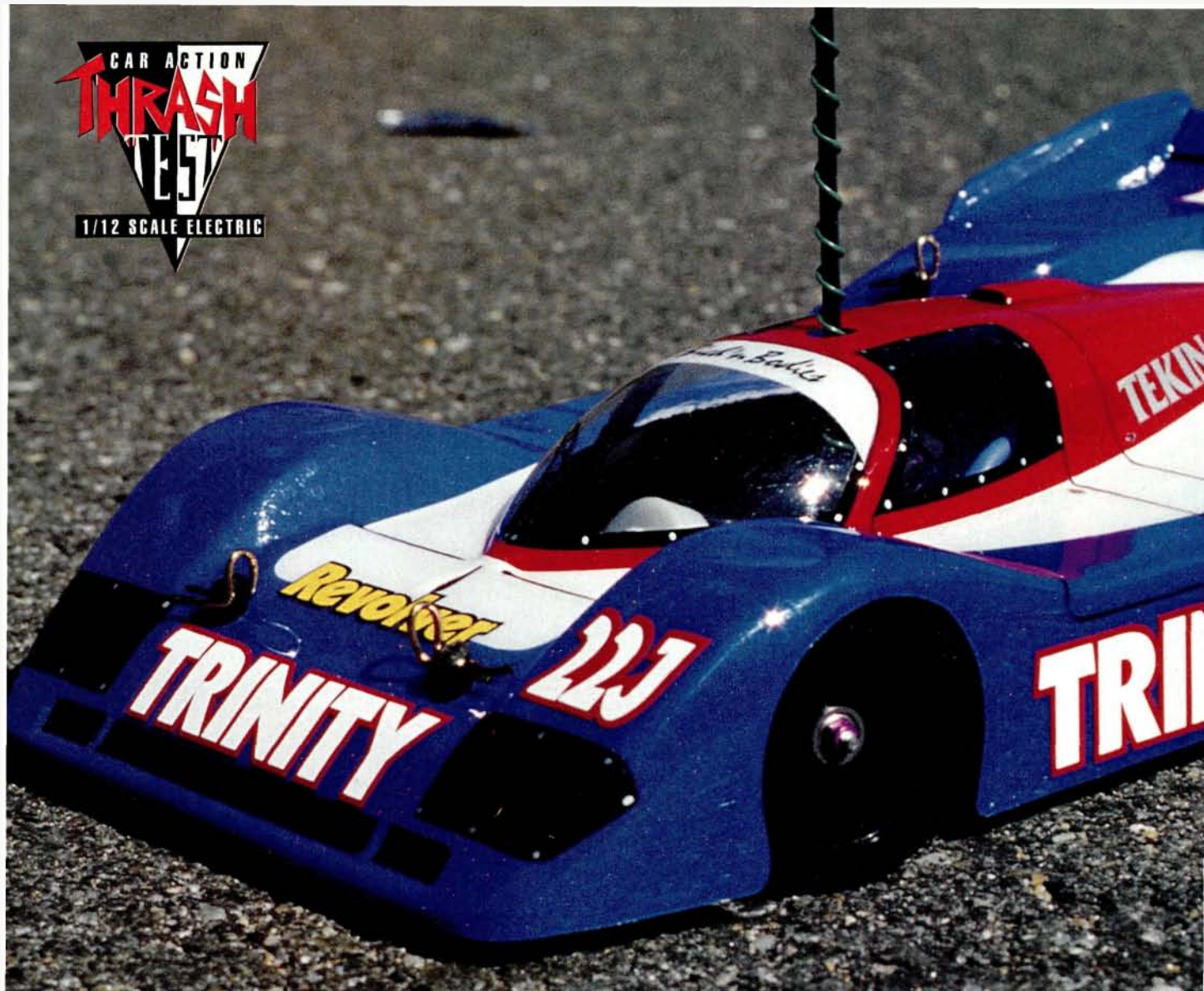
D054 LOLA Fits RC10LSS & EV-10
D041 LOLA Fits 12th Scale Cars



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TESTING THE CURRENT ROAR

TRINITY **Revolver 22j**

by DOUG MERTES

ON ONE OF the Internet news groups that covers the radio-control hobby, a recent recurring thread posed this question: what does it take to make it to the winners' circle in a national event? This series of article postings by contributors from all over the U.S., Asia and Europe went on for several weeks. Some participants thought that equipment made the biggest difference, citing lightness or special high-performance parts not available to the general public. Lots of posts talked about how easy it would be for top-level drivers, whether on-road or off-road, to beat drivers who had less skill even if they had

better equipment. One of the most interesting responses, however, addressed the need for both superior driving skills *and* the very best equipment. The author felt that, at national and world events, it was necessary to have hardware that represented the pinnacle of the sport, because all racers at these events have incredible driving abilities. Sometimes, the right car really does make a huge difference.

So, what does it take to win 22 national titles? According to Joel Johnson, it requires the kind of equipment you see gracing these pages: Trinity's* Revolver 22j—the car that he used to win his 22nd ROAR title at the On-Road Nationals in

1995. What makes this edition of Trinity's proven Revolver series so special that they named it after this victory?

KIT FEATURES

Trinity includes every upgrade part you could possibly desire in the original kit. From the lightweight, yet rigid, graphite chassis plate and pod pieces to the purple-anodized aluminum hardware, this rolling chassis is designed with only one thing in mind—winning races! Let's look at the particulars.

- **Chassis.** I really liked the way the chassis plate was cut to accept the saddle-pack



SPECIFICATIONS

SCALE	1/12
LIST PRICE	\$299
DIMENSIONS	
Overall length	10 in.
Wheelbase	7.75 in. (long) 7.40 in. (short)
Front width	6.6 in.
Rear width	6.75 in.
WEIGHT	
Gross (RTR w/4 cell pack)	1 lb., 9 oz.
CHASSIS	
Type	Single plane
Material	Fiber-reinforced graphite
DRIVE TRAIN	
Type	Direct drive
Primary	Pinion/spur
Transmission	Solid axle
Differential	Prototype ball diff
Slipper clutch	None
Bearings/bushings	Bearings
SUSPENSION	
Type	
—front	Reactive caster on graphite axle plate
—rear	T-bar
Damping	
—front	Silicone-damped kingpin
—rear	Damping tube
WHEELS (F/R)	
Type	Nylon
Diameter	1 3/8 in.
TIRES	
Front	Jaco, Green medium-compound foam
Rear	Jaco, Green medium-compound foam

NATIONAL CHAMP

batteries. The reliefs cut between the cells made it much easier to prepare the chassis plate. By filing the edges down, the batteries dropped in and fit snugly with little finishing effort.

• **Front end.** The reactive-caster front end, first seen on the Evolution 10 car that dominated the 1992 IFMAR World Championships, has been around long enough that knowledgeable folks have learned how to tune it properly. Newcomers to this chassis design will find that many of their fellow racers have successfully mastered the art of tuning via turnbuckle. Yes, it takes some



This reactive-caster front-end design allows you to set up the front end for stability on the straights and lots of steering in the tight stuff.

Building & Setup Tips



I was impressed with the directions that came with the kit. Pictures accompany any awkward steps along the way, and the language is clear, concise and grammatically correct. Newcomers to R/C probably won't be purchasing this kit, but even an old dog like me needs to read the directions in order to ensure a high-quality finished product.

For all intents and purposes, there are only tuning alternatives for this car, not hop-up parts. Here are a few hot tuning tips from Trinity.

- You could replace the front end with the company's own monoshock suspension, but that's only required if you run on very bumpy asphalt or carpeted surfaces.

- For the rear, several different T-bars are available from Trinity that are softer, harder, or longer than the kit-supplied parts. Use the stiffer one for high-grip carpet tracks, such as those at big races where people get a lot of practice and the carpet gets kind of tacky after a while. The longer and softer bars are for low-grip tracks like many that are set up on parking lots on weekends.

- There aren't too many 1/12-scale cars that are comfortable on untreated asphalt, but the 22j seems to work just fine on that kind of surface. Even if your track isn't sprayed with VHT or sugar water, I think you'll be able to find plenty of traction with this baby.

- I followed Trinity's advice and sanded all of the graphite-part edges with no. 400 wet/dry sandpaper under a trickle of running water. Then, using a cotton swab and Zap* CA, I glued the edges to keep them from delaminating in case of a bad crash. It looks neat, too!

- I pinned the diff rings by drilling a 1/32-inch hole in both the axle and hub diff-plate faces. Then, using Zap, I glued a short length of piano wire into each hole and trimmed them to a tiny stub below the height of the diff-ring face so that it wouldn't snag on the spur gear. The rings were easy to notch using a Dremel tool and a small cutting disk. I smoothed things a little more by relieving and polishing the area around the notch. This method prevents the diff rings from spinning on the hubs under acceleration, but replacement is still easy.

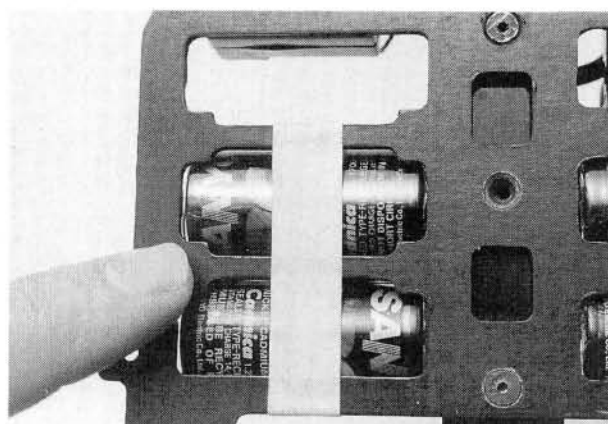
thinking at first to figure out the best combination of reactive caster and camber, but it's fast, it's easy, it's solid, and it really works well.

The kingpin bushings included with the kit are a big improvement over the original front-end setup, where the kingpin rode directly on the graphite axle plate. The bushings can be easily replaced (they just pop out), and they seem to take reaming a little more easily than the graphite.

It should also prevent the holes in the axle plate from becoming elongated from the kingpin's vertical action. Changing front springs is easy, because the spring resides on the bottom of the kingpin; it isn't hidden inside the arm assembly.

- Rear pod. The rear pod is a snap to build—very light, but very strong. I must admit that I was a little skeptical when I saw the parts on the bench. I didn't think that this collection of thin, spindly graphite and aluminum could ever produce a stiff, well-boxed rear pod. Boy, was I wrong!

Rather than the typical damping design that uses washers pressed together against a plate with springs, the 22j uses an innovative damping tube that stretches from one side of the chassis to the other, right in front of the rear pod. Compact, effective and easily adjustable, the tube does a great job of controlling side-to-side roll through a series of tight turns. A large part of good handling is obtained through well-managed, rear-pod action, and Trinity's combination of a high-quality T-bar and a damping tube really does the trick.



Note the way the chassis is cut to allow the batteries to fit snugly; no more flying Ni-Cds!



LIKES

- Easy to build; easy to drive.
- Super-adjustable front end that allows the tuner to set up any combination of caster and camber.
- Uses standard rims and bearings available in any hobby shop.
- Battery cutouts are easy to finish for a proper fit.



DISLIKES

- Some of the purple flat-head screws are a little too soft and easy to strip.

THE COMPETITION		Corally SP12G2	Associated 12LW	Trinity Magic Carpet Ride	Trinity Revolver 22j
	Wheelbase	7.8 in.	7.34 in.	7.85 in.	7.75 in. (long) 7.40 in. (short)
	Width	6.5 in. (F), 6.6 in. (R)	6.80 in.	6.7 in. (f) 6.75 in. (r)	6.6 in. (F) 6.75 in. (R)
	Weight	1 lb., 13 oz. (4-cell)	2 lb., 34 oz. (6-cell)	1 lb., 12.8 oz. (6-cell)	1 lb., 9 oz. (4-cell)
	Diff type	Ball	Ball	Ball	Ball
	Chassis	Fiber-reinforced graphite	Graphite	Graphite	Fiber-reinforced graphite
	List price	\$285	\$245	\$299.99	\$299
	Available at*	n/a	\$114.99	\$163.99	\$169.99
	Reviewed in	9/95	2/92	To come	6/96
	*Prices vary with location.				



This rear damping tube takes the place of the more commonly seen washer-type damping system.

• **Differential.** The differential is smooth, smooth, smooth, thanks to premium parts, Trinity's Magic spur gear and high-quality bearings.

• **Tires and wheels.** The kit also comes with some of the best tires and wheels in the business: Jaco* composite wheels shod with their green-compound foam. These are the same wheels used by Joel at the Nationals, and they're the choice of many top racers across the country. If the green foam isn't right for your track, Jaco makes these same wheels and tires in a full range of standard and exotic compounds.

The rest of the kit is very straightforward to build; I don't think that very many experienced racers will find any-

thing too unusual. Although I'm not a big fan of Delta-type shock absorbers, the one found on this kit went together easily and was a snap to bleed and adjust. I'd like to try Trinity's large-volume shock in the future to see if there's any difference in performance.

TEST GEAR

I figured that a car of this reputation deserved some high-quality running gear, so I installed really primo electronics: a Tekin* TSC

G-12 speed control (love that high-frequency switching and the replaceable wires), a matching narrow-band Tekin FM receiver, a Futaba* 9601 steering servo, a 14-turn triple-wind Trinity Team Edition modified motor and a set of Trinity World Tech, matched, 4-cell Sanyo 1700s. These are now discharged at 30 amps instead of 27 amps to ensure that they will hold up under the high discharge rates found in modified racing.

PERFORMANCE

Does it make me drive like Joel Johnson? Testing the 22j proved a difficult proposition, but I was able to pull it off. A state championship race came up just after I had finished assembling the car, so I

THINGS YOU'LL NEED

- Electronic speed control
- 4- or 6-cell battery pack in saddle configuration
- Stock or modified motor (check into special 4-cell modified winds)
- Receiver
- Transmitter
- Small steering servo
- Battery charger



Factory Options

- Short T-bar—part no. RE 1008
- "Orlando" T-bar—RE 1026
- T-bar tuning kit—RE 1029
- Front spring set, two each in three sizes—RE 1058
- 4-cell chassis—RE 1040

entered the 1/12-scale, 4-cell stock class in addition to Formula 1. I also brought along another 1/12-scale car for comparison, and I ran them both during practice and qualifying. It kept me busy all day, changing motors and batteries heat after heat, but nobody seemed to notice that

BODY LANGUAGE

When I tested the 22j, I also ran one of Protoform's new WSC Courage bodies and their tried-and-true Nissan P35, which is what I normally run on my 1/12-scale cars. I was curious, though, to find out how the different bodies might affect the car's handling. Having raced oval cars for several years on a banked track, I knew that Lumina, Thunderbird and Grand Prix bodies from different manufacturers had aerodynamic qualities that made a big difference in top speed. Would the same rules apply to 1/12 scale? I decided to find out.

First, I gathered up a bunch of current 1/12-scale bodies and some past favorites: the previously mentioned Protoforms, a BBR* 333SP Ferrari WSC body, one of BBR's classic Lotec bodies, an Associated* Nissan, a BRP* Racing Nissan, an Andy's* Nissan and an Andy's Lotec. Yes, I know that many other bodies are available, but I thought that this selection represented the majority of those that are currently available.

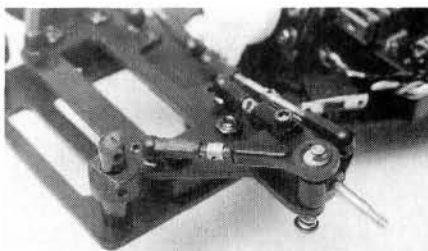
After painting all the bodies (believe me, they were pretty basic, one-color jobs!), drilling the body posts and antenna holes and making sure they all fit properly, I used the following test format: same motor, equivalent batteries, 2 minutes on the same course and every lap against the clock. I was the only driver, and I figured that I would allow adjustments to the suspension if they were necessary. No tire changes were permitted. I ran one body for 2 minutes, pulled in, changed batteries and bodies, adjusted the body posts if needed and went right back out to drive again. Not exactly scientific, but I figured an average racer would perform the same tests if he had

the time and resources to test eight bodies on his home track. Was there a big winner in the group?

As it turned out, all the bodies performed pretty much the same. The WSC bodies were a little lower along the top plane, and they seemed to fit the chassis more closely. Some of the bodies required larger wheel openings because of their design, or they fit the 22j better because of its tall, left, rear pod side (where the damping tube fits), but none was consistently faster on the racetrack than the others. On the other hand, they all look a little different (actually, the WSC cars look a lot different), which gives the field some potential for differentiation in something other than body color. I think you can pick a body based on aesthetics these days and still come up with a good product. Now, that's good news!



TRINITY REVOLVER 22j



This reactive-caster front-end design allows you to set up the front end for stability on the straights and lots of steering in the tight stuff.

the car I had driven in the second and third heats was different from the one I had run in the Mains. The 22j was easily a lap faster than my other 1/12-scale car, partly because its superior traction allowed me to run much harder-compound tires on both ends. I drove both of those 8-minute heats without making a wrong move or tapping a board (unusual for me), and the car was really pretty easy to dial in on the carpet. If I had a little more track time with the car, I'm sure I would have done better than my eventual 6th-place, A-Main finish.

Unfortunately, this has been a brutal winter where I live with lots of snow and ice; not what you'd call great parking-lot weather. Lucky for me, I had scheduled a business trip to a sunnier climate. I just popped the car in my suitcase (with charged batteries and my radio) and took it with me. I only had a little time with the car on asphalt (I didn't take a charger for the spent batteries), but it made me hungry for more! There's nothing quite like powering around a turn on pavement while driving a fast 1/12-scale car, especially when it's wearing a super body like the Protoform* WSC Courage that has been painted by Scott Bich of Bich'n Bodies*. I only wish that I'd been there on the weekend for a local club race! This puppy hums on asphalt, especially when it's set up with the front suspension in the "long" position and uses the long, kit-supplied T-bar.

FINAL THOUGHTS

I'd always wondered what it was like to drive a car just like the ones driven by world and national champions. When I first started out in R/C, I thought that equipment was the only thing separating the fast guys from the rest of us. As I got older, I realized that driving skills and the ability to perform under pressure play a much greater role in reaching the pinnacle of racing success. I know that I'm no Joel Johnson, but I do have a better understanding of what it takes to get to that level of expertise: natural talent, lots of practice, and the right equipment—like Trinity's 22j!

*Addresses are listed alphabetically in the Index of Manufacturers on page 184.



Clod-A-Leaver II Wins 1995 NR/CTPA World Championship

Joe Kirkwood won the 1995 World's driving a Clod-A-Leaver II-equipped Clod Buster. Other special parts used included a Tekin 420-62 speed control, PTI batteries, Trinity Kinwald motors and Thorp ball diffs.

The same chassis/suspension/steering kit is available to you and gives much better handling, much better steering, superb high-speed stability and tremendous durability for high-speed racing or just having a great time.

The kit fits both Clod Buster and Bullhead vehicles. Included in the kit are the light-weight chassis, battery tray, receiver and speed-control tray, long-wheelbase stainless ladder bars, heavy-duty 6-32 ball ends, axle-mounted steering-servo bracket/brush guard assembly, stainless-steel tie rods, full cantilever shock-mounting system and front and rear sway bars. All of these things are standard equipment on every **Clod-A-Leaver II** (note: cantilever shock-mounting and sway bars have been standard on **Clod-A-Leavers** since they became available in 1992). If you don't have a Clod Buster and would like to build one up from parts, you will need the following: the **Clod-A-Leaver II** Kit, two complete Clod Buster axle/gearbox assemblies, shocks, motors, all electronics, body, body mounts, wheels and tires. These parts are all available new from **Bennett Equipment**, or we also have a good selection of used parts at a 30 to 50% savings. We also have available rolling chassis or complete vehicles with the **Clod-A-Leaver II** Kit installed. We also have in stock motors, custom wheels and most other special parts for Clods as well as the stock Tamiya parts. The suggested 2-wheel-steering version of the **Clod-A-Leaver II** is \$225 and the 4-wheel-steering version is \$250 (both are 4-wheel drive).

The **Clod-A-Leaver Jr.** is a new chassis kit available for those on a budget or as an entry-level vehicle. This kit can be upgraded at any time to the full **Clod-A-Leaver II** specifications. The kit features the same light-weight (8 1/4 oz.) chassis, the same long wheelbase, stainless-steel ladder bars and the same heavy-duty 6-32 ball ends. The kit also includes extended steering rods and a relocated steering-servo mount. This kit will greatly improve handling and durability of the stock Clod Buster or Bullhead. The **Clod-A-Leaver Jr.** sells for \$129. The upgrades to bring it up to **Clod-A-Leaver II** specifications are: the steering kit with brush guard for \$32 (two required for 4-wheel steering), the sway-bar kit for \$40 and the full cantilever shock-mounting brackets for \$50.

Bennett Equipment

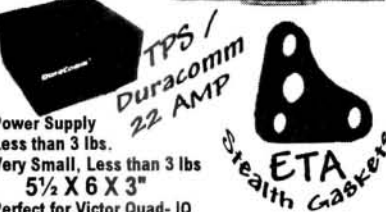
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Dubro
Dumor
East Coast
Edge
Elite Speed
ESP
ETA
Excel

Fast Lane
Gator
Holeshot
Hot Bodies
Hot Socks
HPI
Hyperdrive
Irrgang
Jammin
Kimbrough
Lightning Rod
Lightspeed
Litespeed
Lunsford
Lupo
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MIP
Mighty Motors
NMB
Novak
Ofna
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Race Prep
Racer Choice
Racer's Edge
Racetech
Raceway mfg
RCM
RCPS
Robinson
Royal
RPM
Saiko
Sassy
Schumacher
Slitix
Speedworks
Stage III
TA Emerald
TD Ent.
Tamiya
Team Losi
Technacraft
Teddy's
Tekin
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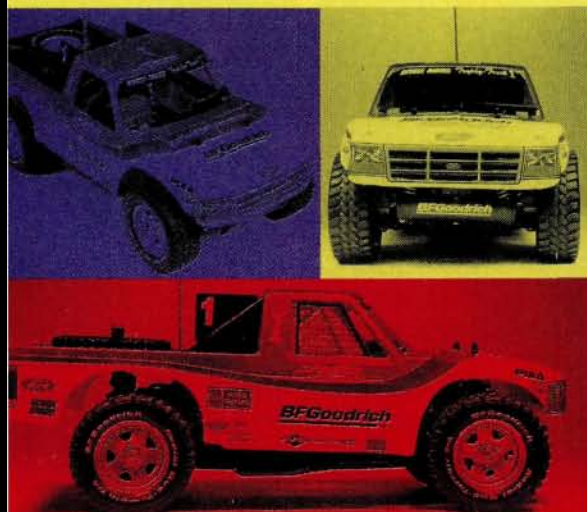


The latest addition to Tamiya's desert truck lineup

by Kevin Hetmanski



SPECIFICATIONS



SCALE 1/10
LIST PRICE \$236

DIMENSIONS
Length (overall) 16.5 in.
Wheelbase 10.25 in.
Width (F/R) 7.25 in.

WEIGHT (gross, RTR) 3 lb., 5 oz.

CHASSIS
Type Molded tub
Material Plastic

DRIVE TRAIN
Type Sealed gear drive
Primary Pinion/spur
Transmissions Dogbone/axles
Differential Ball and gear
Slipper clutch None
Bearings/bushings Plastic and metal bushings

SUSPENSION (F/R)
Type 4-wheel, independent lower A-arms
Damping Oil-filled, coil-over plastic shocks

WHEELS (F/R)
Type One-piece plastic
Dimensions (DxW) 2x1 in.

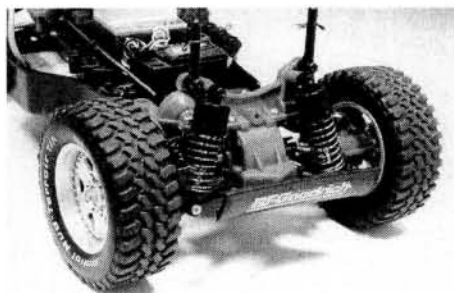
TIRES (F/R)
Type Semi-pneumatic, "realistic" off-road

ELECTRICS
Motor 540 stock
Battery Not included
Speed control Three-step mechanical

FULL-SIZE OFF-ROAD desert truck racing is a popular and growing sport. These trucks were clearly built with durability in mind. They can withstand hours of hardcore, off-road bashing. Tamiya* has injected the excitement of rugged off-road racing into 1/10 scale. First, Tamiya came out with Toyota and Chevy off-road racers, and as the popularity of these trucks grew, they developed another scale beauty—the Ford F-150.

KIT FEATURES

The F-150 kit is relatively easy to put together. All the parts are neatly packaged in well-labeled bags, and the kit's instruction manual is easy to read and understand. It took me only about four hours to



A large bumper up front helps keep the truck's front end from plowing into the dirt. Plastic oil-filled shocks provide the damping.

where you plan to run your truck.

The F-150 has a reliable, shaft-driven 4WD system that has a smooth ball differential in the rear and an equally smooth planetary gear diff in front. Tamiya has made gear maintenance a breeze. Just remove a few screws, and you're in the gearbox. A special adapter for mounting the motor on the gearbox is included. This adapter has several mounting holes that allow you to use a wide variety of pinion gear sizes. You no longer have to worry about gear mesh because it

has been figured out for you.

The F-150 body included in the kit is very impressive. It's detailed to the max, right down to the spare tire in the bed. The body is made of durable, light Lexan. It will take a beating and come back for more. The body is covered with a thin vinyl coating, which protects it from being scratched and also protects it from overspray during painting. The first thing I did before painting the body was to add the kit-supplied window masks to the windows. The mounting holes were already cut out of the body, so putting the body on the truck was a breeze.

TAMIYA Ford F-150

build the kit and about an hour to paint the body. The F-150 chassis is based on Tamiya's now-famous TAO2 chassis (why mess with success?). This chassis is offered on most Tamiya sedans.

There are some slight differences between the F-150 and its sedan counterpart. It sits much higher off the ground for better ground clearance, and obviously, it has bigger tires. The suspension is controlled by four oil-filled coil-over shocks. Tamiya supplies you with ride-height spacers and three shock pistons to choose from. This makes it very easy to tune your suspension according to

Building & Setup Tips



Read the instructions carefully before you start assembly, and take your time. This will make things a lot easier.

- According to the instruction manual, 16 plastic bushings and six metal bushings are to be installed—mostly in the gearboxes. With all these bushings, the drive train is bound to have a considerable amount of drag, so apply plenty of grease to the bushings. I installed a complete set of ball bearings during the building process, because I didn't want to tear the units apart later.

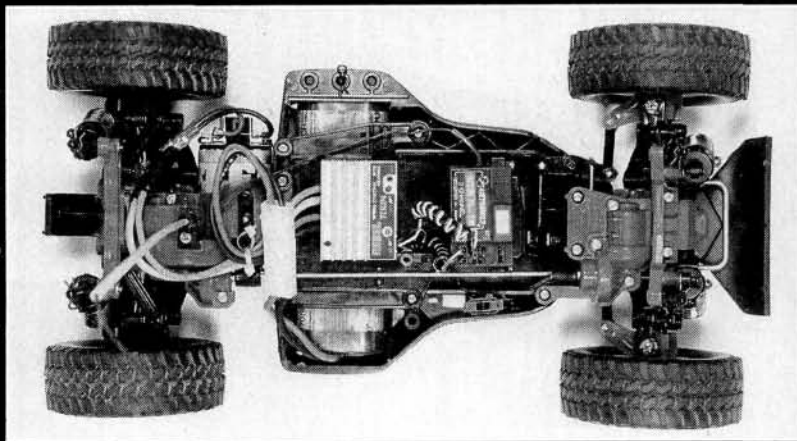
- When you install the rear gearbox joints, don't install them backwards—a common mistake. Notice that the longer joint used in this step is identical to the one used in Step 1 for assembling the front differential. Even though the instructions don't call for it, I added grease to the rods on which the A-arms pivot to minimize friction.

- In preparation for painting, the body should be cleaned with soapy water and dried with paper towels to remove unwanted dirt and fingerprints. Paint the darker colors first. I masked off the areas to be painted black and painted those areas. After that was done, I applied the red stripe sticker to the outside of the body (after removing the outer coating) and used that as a guide when taping off the area to be painted blue. First, I applied a few coats of metallic blue and backed that up with blue. I then finished with white; all that was left to do was to apply the stickers. Once completed, the masking tape, window mask and protective vinyl coating were removed. To apply the decals, simply cut them out, peel off the backing, and stick them on. This took more than an hour to do because of the care it takes to line up the stickers and prevent bubbles from forming. Many people recommend using soapy water on the body to allow positioning of the decals. Once the soapy water dries, the decals stick permanently in place.



Aggressive desert-type tires handle the dirt and pavement with ease.

The Tamiya Ford F-150 is based on the venerable TAO2 chassis. A durable drive train and suspension system help this truck get over tough terrain. I equipped my truck with a Tekin Rebel ESC with reverse, a Trinity 14-turn triple T-Tech and Airtronics radio gear.



THINGS YOU'LL NEED

- 2-channel radio system
- Battery pack
- Battery charger
- Needle-nose pliers
- No. 1 and no. 2 Phillips screwdrivers
- Nail clippers (for trimming pieces off trees)

- Lexan scissors
- Lexan paint



Factory Options

- Universal shaft set—part no. 53115
- Hard joint cup set—53118
- 4WD bushing and ball connector set—54144
- Short-type hard propeller shaft—53152

TEST GEAR

- Airtronics* Caliber 3P radio
- Futaba* S-148 servo (to control the steering)
- Tekin* Rebel ESC (with reverse)
- 14-turn triple Trinity* T-Tech motor
- Dynamite* 1700 SCR battery pack

PERFORMANCE

After about five hours of assembling the kit and painting the body, I couldn't wait

to see what this truck could do. I wanted to test this truck on the pavement and also in the dirt, so I packed up my stuff and headed for the nearest parking lot. The first thing that blew me away was how fast it was, thanks in part to the Trinity T-Tech motor. Even though the tires were made for off-road, they gripped the pavement very well. The steering was a little unresponsive because of the way my suspension was set up. The truck leaned a lot in the turns, and when I pushed it hard enough, the truck's somewhat high center of gravity helped it tip over easily. My rear diff was slipping a little, but it took only a few minutes to fix, and I was back on the road.

When my battery started running down, I decided to charge up again and go have some fun in the dirt at a nearby construction site. The truck handled all the obstacles well. Again, the narrow width and the truck's high center of gravity made it a little tipsy, but that was to be expected. Once I hit the dirt, the steering was a bit more responsive. Under power, there was a little 4WD drift action going on—pretty cool! Under braking, the truck was very easy to control, because four wheels stop you instead of two.



LIKES

- Great detail on the F-150 body.
- The chassis can take a beating.
- Great instructions make assembly a breeze.
- Relatively inexpensive.



DISLIKES

- Non-adjustable suspension components.
- Plastic bushings.

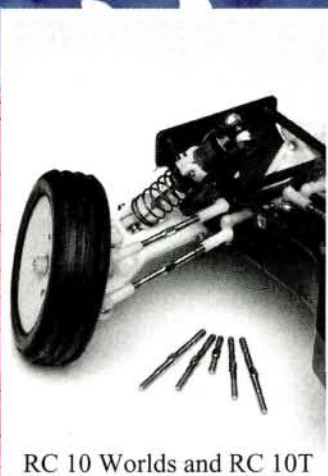
FINAL THOUGHTS

I think that this truck is great for beginners who want to get started in the R/C hobby without spending a lot of money. The F-150 is a great truck for backyard bashers who want a scale-looking vehicle. It's pretty tough, too, so rest assured that the truck will be up and running for quite some time. I had a great time building and running this truck, and I'm fairly confident that everyone who appreciates scale realism and off-road ruggedness will have an equally good time with this kit.

* Addresses are listed alphabetically in the Index of Manufacturers on page 184.

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TECH HEAD

by Frank Masi

Going Faster with Caster

WHAT IS CASTER? The best definition I've read comes from Cliff Lett's tuning supplements for Associated racing vehicles: "(Caster) describes the angle of the (steering) kingpin, in relation to the vertical plane, when

rearward creates a positive caster angle.

Zero degree caster is not used in off-road and is seldom used in on-road; negative caster is not used. Most vehicles operate most effectively with some positive caster, with off-road vehicles using caster angles of up to 30 degrees and beyond.

WHY USE CASTER?

Caster performs two important functions:

chassis roll, place your off-road buggy or truck on a flat surface (these vehicles' greater suspension travel best demonstrates the effect of caster). Point the front wheels straight ahead, and lean the vehicle's chassis to one side to simulate the chassis roll that occurs during cornering (see Figure 2). Notice that when you lean the chassis, all four tires follow suit.

A tire provides the most traction when it's perpendicular to the ground and its contact patch, or "foot," is largest; chassis roll places the tire at an angle that reduces the size of its contact patch. Turn the front wheels to steer the vehicle, and the contact patches of the front tires are further reduced. Luckily, adding positive caster to the steering

kingpins (leaning them backward) can compensate for the effects of chassis roll and steering angle.

Lean your vehicle's chassis again, but this time, turn its front wheels to simulate cornering (see Figure 3). Notice how the front tires become almost vertical as the chassis is leaned; this is caster at work! As a rule, the more your chassis rolls, the more positive caster you'll need to compensate for it. Off-road cars and trucks have greater suspension travel, compliance and ground clearance, so they usually experience more chassis roll. On-road cars have less suspension travel and sit much lower to the ground, so they require less positive caster.

Have you ever rolled your newly built chassis

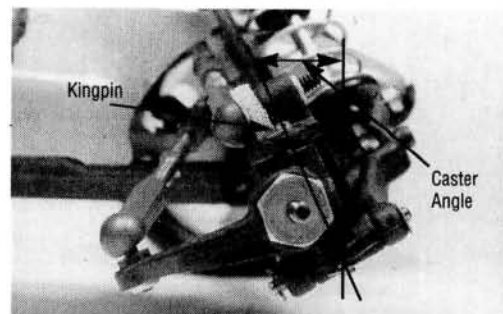


Fig. 1. Caster refers to the angle of the kingpin around which the steering arm pivots. This Team Losi Double-X buggy has optional 25-degree caster blocks, i.e., the kingpin is leaned rearward 25 degrees in relation to the vertical plane.

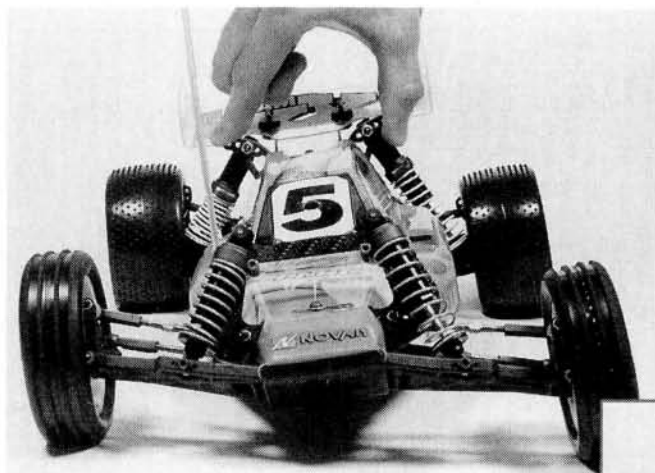


Fig. 2. Chassis roll makes the tires lean in the direction of the roll and diminishes their contact patch.

looked at from the side of the car." (See Figure 1.)

DETERMINING CASTER

Caster is described in terms of the angle at which the kingpin is leaned. If the kingpin is vertical, caster is 0 degree. Leaning the kingpin forward creates a negative caster angle and, conversely, leaning it

- During cornering, it compensates for chassis roll to keep the front tires in better contact with the ground.
- It improves straight-line stability.

To illustrate how caster compensates for



Fig. 3. During hard cornering, caster angle brings the tires back to nearly vertical to improve front traction.

(sans steering servo) across the floor and noticed how, like a shopping cart, it automatically straightens its wheels? This is another effect of positive caster—one that helps your car to track straight. Because the steering kingpins are leaned rearward, your car's front tires are tilted up on their edges whenever they are moved from a straight-ahead position. This creates a side loading of the tires that forces them back to a straight-ahead position (see Figure 4). The greater the positive caster, the larger the side loading.

FINE-TUNE YOUR STEERING WITH CASTER

Think of turns as having an entrance, a middle and an exit; probably

Depending on the radius of the turn, chassis roll *may* increase slightly when the vehicle exits it and throttle is applied, in which case, steering will also be slightly increased. But usually, mid-turn and exit steering are similar.

In theory, greater positive caster improves "turn-in" ability and diminishes mid-turn and exit steering. It also improves steering during high-speed turns and at any time when chassis lean is pronounced.

Using slightly less positive caster is a good way

handling during turns and poor straight-line stability. A car with too little caster will experience what I call "push, hook, push" cornering—not good!

Most racers use positive caster of between 25 and 30 degrees on their off-road buggies. Off-road trucks seem to work best with 30 degrees of caster. On-road, pan-type cars (the ones that turn both right and left!) work well with 2 to 4 degrees of positive caster, and their oval-racing brethren seem to work best with slightly more.

Caster is a big subject to cover in such limited space, but I've tried to touch upon the major points. There are many other factors that will affect your ideal caster angle (camber comes to mind), but with a basic understanding of caster and how it influences handling, you'll be ahead of the pack before the race begins!

As always, send your questions and comments to Tech Head, c/o Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035, or e-mail me at frankm@airage.com. ■

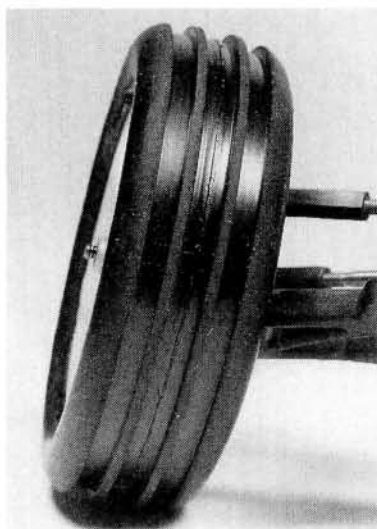


Fig. 4. By placing the tire on its edge to create side-loading, caster also improves the car's straight-line stability.

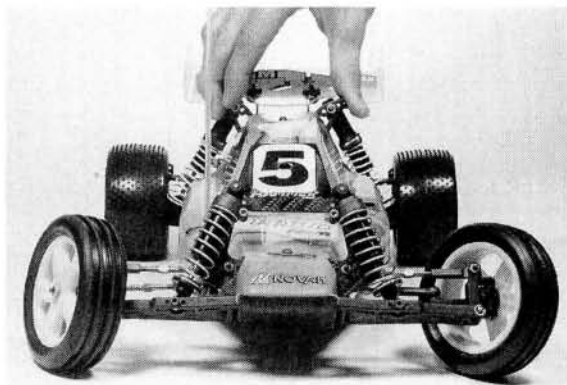


Fig. 5. Because it rolls the tires onto their edges when taking low-speed corners (where chassis lean is minimal), greater caster can actually decrease steering.

more than any other factor, caster affects how much steering your car has during each of these. Greater positive-caster angle provides better steering during the entrance to a turn (where chassis lean is usually greatest). During the middle of a turn (as chassis lean is lessened), greater caster places the front tires up on their edges, so steering is reduced. (See Figure 5.)

to gain more steering in the middle of a turn and through most types of low-speed turns. The drawback is that you'll lose some turn-in (you can overcome this by using brakes), and the car will be more likely to "hook" or oversteer when exiting turns because the tires will be in better contact with the ground. Using too little positive caster, however, will result in very unstable

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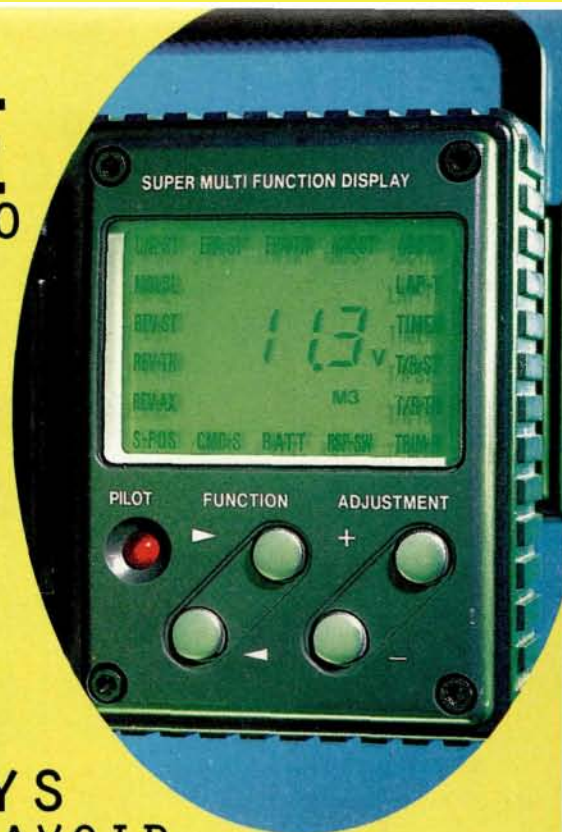
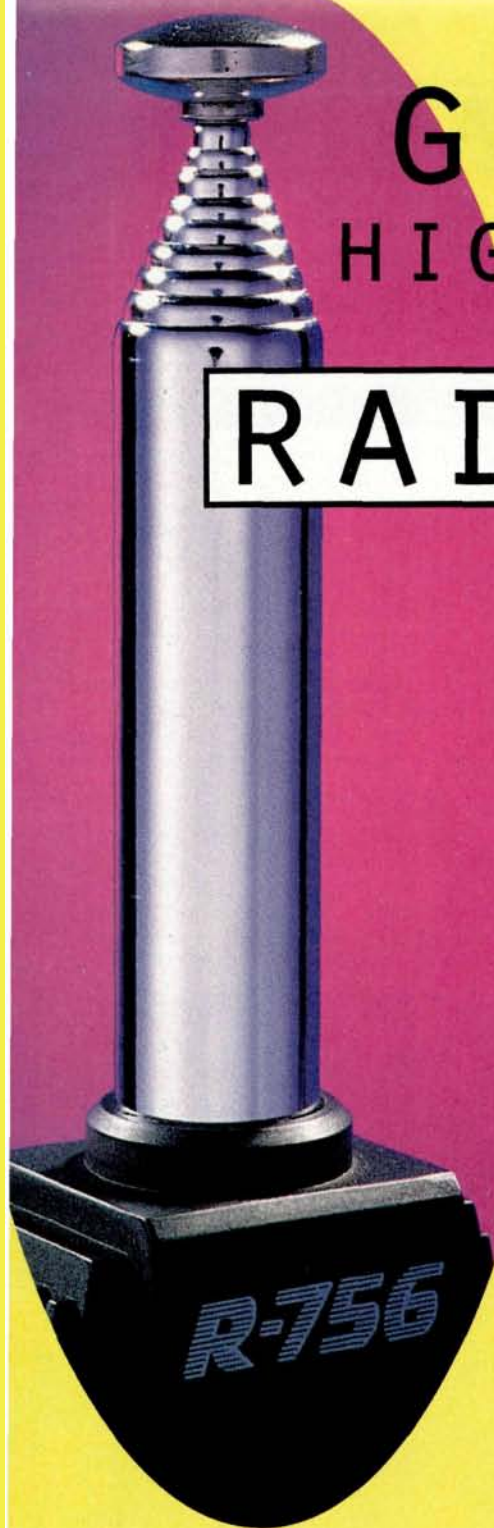
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GUIDE HIGH-END^{TO}

RADIOS

11 WAYS TO AVOID MIXED SIGNALS

by Stan VanDruff



HERE IT IS: the greatest guide to R/C racing radios ever compiled!—11 of the most advanced, most feature-rich radios available. If you're a dedicated racer, or you have several cars that you want to control with one radio, or you just love sophisticated electronics, you'll find something here to drool over.



GUIDE^{TO} HIGH-END

RADIOS

The radios described here are all FM (PPM: pulse-position modulation), and some also have PCM (pulse-code modulation). The sophisticated, top-of-the-line computer-controlled radios allow you to store settings for three to eight models and to recall any one at the touch of a button. With some, the functions you need most can be only a push of a button away.

Keep in mind that the more complicated radios take thought and practice to use, but when you've mastered them, they'll make your car easier to set up and control on race day.

And if you find that these radios are too much for your taste—or your budget—be sure to check out the "Budget Radio Guide" in our November '95 issue.

FUTABA

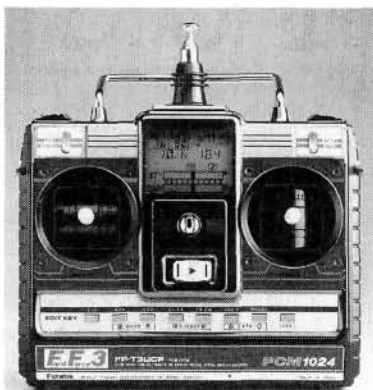
Futaba's* offerings are in a state of change right now. The incredible 3PJ will replace the discontinued 3PB at the very top end. A new FM model will replace the 2PD-FM before year's end. I will miss the distinctive shape of these two, but like their predecessors, the new radios should prove to be of the highest quality. If you need electronic mixing, Futaba is the only maker to provide it on surface radios.

3PB Magnum. The 3-channel 3PB must rank as the most sophisticated non-computer radio on the market. It's an FM (PCM) unit that shares its unique case design with the 2PD. Behind that little smoked plastic door are 10 trim potentiometers and eight dip switches



for controlling everything from high/low end-point adjustments to servo mixing. The third channel is proportional, but it doesn't give you as much servo angle as the two main channels. It provides three types of servo mixing: twin-servo steering (for really big trucks and gas cars), 4WS and torque-steer compensation for boats. It includes a fail-safe, but you can only set the throttle to a preset position; the other channels are automatically set to neutral. The 3PB has been discontinued in favor of the 3PJ, but should still be around on dealer shelves.

3UCP. Futaba's top-of-the-line, surface, stick-type model is a 3-channel FM (PCM) computer radio with 6-model memory, and it comes with software for R/C cars and boats. It has a large, easy-to-read LCD and the squarish case is



well-laid-out. Special features include two programmable mixes as well as preset mixing for twin steering servos, 4WS and outboard tilt mixing. It has ATV on all three channels, programmable one-touch function keys, a timer, a stopwatch and an alarm.

2PD Magnum. Its unusual case (and that of the 3PB) doesn't look ergonomic, but I find it very comfortable to hold. (The grip is much slimmer than that of the Magnum Junior or Sport.) The controls you need to access during a race are conveniently positioned, while less used functions are protected behind a plastic door. It has all the standard features—steering dual rate, ATV and sub-trim—but none of the frills.



3PJ Magnum. This model comes with so many new features that it would take an entire article to describe them (stay tuned to these pages). You can buy it as an FM (PPM) or PCM system. The case is by far Futaba's most ergonomic and exotic (and it's reversible for left-handers). Its list of features is mind-boggling. Of course, it has dual rate, expo, sub-trim and digital battery read-out. It has 8-model memory, and you can name each model with six characters (characters include letters, numbers and all kinds of symbols). It has a race time clock with alarm and pre-alarm (in other words, you can set it to go off at any number of seconds before the end of the race). It can keep track of your lap times, and it can pace you by beeping at regular intervals (set it to beep at your ideal lap time).



The 3PJ has two programmable thumb wheels and several programmable buttons to which you can assign almost any function. It's the first with an anti-lock-brake system and traction control that work with any electronic speed control. And for gas cars, it has an idle-up setting that opens the throttle until the engine starts. Finally, the auto-start throttle setting allows you to punch the throttle at the starting line, but the engine or motor will accelerate only to a predetermined value to prevent you from spinning. As soon as you ease off the throttle, your original throttle setting is reset and you have full control for the duration of the race.

AIRTRONICS

These Airtronics* transmitters are packed with features, but are less complicated than most high-end radios. They both feature a reversible grip for left-handers. My only gripe with these two is that the antenna isn't compact enough when folded, so they're a little more difficult to store.



CS2P—one of the least expensive full-feature radios available. The CS2P is very easy to set up because you don't have to program it. It uses potentiometers for all adjustments, and you can see all your settings with one glance. It has all the features required of a racing radio, such as dual rate and expo, and its low-slung case is well-balanced but has an unusual feel. It should be noted that the CS2P is the choice of many top drivers.

Caliber 3Ps. Airtronics' top-of-the-line computer radio is an enhanced version of the venerable Caliber 3P. It fixes a bug in the trim memory, is easier on batteries and has several additional desirable features. It has an easy-to-read LCD and a minimum of buttons. Unique is its trim memory that allows you to extend the trim range on your servos (I found it handy when a bent tie rod threw the steering way off in the middle of a race). With its included, direct-control cable, the Caliber allows you to check your settings without transmitting a signal, and its volume control is bound to improve your popu-



larity on the drivers' stand. For gas cars, it has an idle-up setting that makes a car easier to start. As soon as the car starts, bump the throttle, and it returns to normal idle.

JR REMOTE CONTROL

JR Remote Control* is well-known for its comfortably shaped transmitter cases. JR transmitters put out 750mW (the maximum allowed by the FCC), and their receivers feature patented anti-blocking, cross-modulation and window circuitry (ABC&W) to reject unwanted signals and noise.



X-756—a stick radio with the same features as the R-756 wheel radio. Its LCD is bigger than the one on the R-756, and the special grip dials are labeled more clearly (there's more room on a two-stick case). These programmable dials are on the top corners of the case where you can easily move them with your fingertips (assuming you

drive with only your thumbs on the sticks). The top left of the case (an easy reach for your index finger) sports a button that can act as a throttle preset/panic brake, or can control the on-board timer. On the top right corner is a switch that "toggles" between two steering-expo modes. If you have your steering set for limited travel and find your car stuck against the wall, toggling this switch will restore full steering until you're back on the open track.

R-756—a very sophisticated 3-channel FM (PCM) computer radio that has been available since 1992. Its case (co-designed with KO Propo) is still one of the most comfortable available. The R-756 is easy to program, although its display is smaller than the ones on the Caliber and Futaba 3PJ. Some people find the "membrane" keypad a little hard to press, but it's impervious to dust and moisture. This radio comes with a wide array of features, including a unique trim alarm that warns you if the trims were bumped after the radio had been switched off (which happens all too often in the radio impound). With arrows on the LCD display, it even shows you how to put them back the way they were.

The R-756 can store settings for six models. It uses mechanical trims, though, so it can't automatically reset them when you switch models. It shows you where the trims belong (again, with the arrows on the LCD display), but you

have to adjust them yourself. Its two thumb wheels can be programmed to act as brake trim, steering trim, or the third channel. A programmable thumb button can function as a throttle preset/panic brake, stopwatch, or lap timer. If your hands are small, you might have a little trouble reaching the thumb button and the second thumb wheel with your left hand. You can get the R-756 as a FM (PPM) or PCM model. The PCM enjoys a fail-safe that will send all three channels to any position you want if you completely lose the signal.



RACING RADIO GUIDE

	Airtronics		Futaba				JR	
	CS2P	Caliber 3Ps	3UCP	2PD Mag.	3PB Mag.	3PJ Mag.	X-756	R-756
Channels	2	3	3	2	3	3	3	3
FM / PCM selectable	FM	FM	FM/PCM	FM	FM/PCM	FM/PCM	FM/PCM	FM/PCM
Stick/wheel	Wheel	Wheel	Stick	Wheel	Wheel	Wheel	Stick	Wheel
Servo-reverse (Throttle)	•	•	•	•	•	•	•	•
Servo-reverse (Steering)	•	•	•	•	•	•	•	•
EPA / ATV (Throttle)	•	•	•	•	•	•	•	•
EPA / ATV (steering)	•	•	•	•	•	•	•	•
Exponential (steering)	•	— ⁴	•	—	•	•	•	•
Exponential (throttle)	•	— ⁴	•	—	•	•	•	•
Trim (steering)	•	•	•	•	•	•	•	•
Trim (throttle)	•	•	•	•	•	•	•	•
Dual rate (steering)	•	•	•	•	•	•	•	•
Wheel/stick tension adj.	•	•	—	•	•	•	•	•
Adj. neutral (throttle)	—	—	2:1/1:1	2:1/1:1	2:1/1:1	2:1/1:1	•	•
Battery meter	Analog	Digital	Digital	Analog	Analog	Digital	Analog	Digital/analog
Low-battery warning	—	•	•	—	•	•	•	•
Ni-Cd charge jack	•	•	•	•	•	•	•	•
BEC	•	•	•	•	—	—	•	•
Left -handed available	•	•	—	—	—	•	—	—
Fail -safe	—	—	• ¹	—	• ¹	• ¹	• ¹	• ¹
accessory								
Power supply	8 AA	8 AA/Ni-Cd	Ni-Cd	8 AA	Ni-Cd	8 AA	8 AA	8 AA
Power output	500 mW	500 mW	750mW	500 mW	750 mW	750mW	750 mW	750 mW
Frequency band	27/75	27/75	27/75	27/75	27/75	27/75	27/75	27/75
Warranty	1 yr.	1 yr.	1 yr.	1 yr.	1 yr.	1 yr.	1 yr.	1 yr.
Sub -trim	—	• ²	•	•	•	•	•	•
Direct servo control	•	•	•	—	•	•	•	•
Model memory	0	3	6	0	0	8	6	6
Mixing	—	—	•	—	•	•	—	—
Plug-in RF modules	•	•	•	—	•	•	•	•
3rd channel proportional	—	•	•	—	•	•	—	—
Stopwatch	—	•	•	—	—	•	•	•
Lap timer	—	•	• ³	—	—	•	•	•

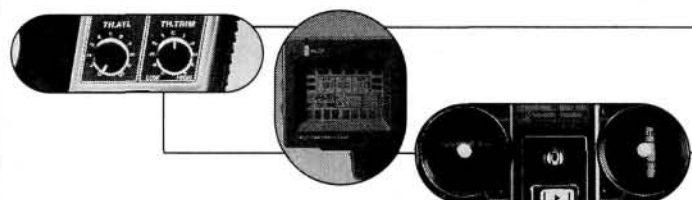
¹Requires PCM receiver.

²Has adjustable trim rate that performs same function.

³10 laps only.

⁴Has adjustable dual-rate control, which is similar.

*Modified module available, and has cord that goes directly to receiver.



TERMS

USED IN
THE CHART

Servos available with systems

Brand/model	Torque (oz.-in.)	Transit time (second)	Comments
• Airtronics			
94102	50	0.22	General-purpose, trucks
94145	45	0.20	General-purpose
94155	80	0.07	1/10-scale on- and off-road
94156	110	0.10	Monster trucks, 1/8 and 1/4 scale
94831	38	0.21	Smaller cars, 1/12-scale on-road
• Futaba			
S132H	25	0.13	Smaller cars, 1/12 scale
S9301	70	0.22	Gas, trucks, monster trucks, boats
S9304	70	0.22	Gas, trucks, monster trucks
S9101	42	0.17	1/10 and 1/12 on-road
• JR			
4735	90	0.15	High-performance 1/10 and 1/8 scale
507	40	0.25	General-purpose



Radio Combos

These systems were designed for serious racers. None of the radio makers offers a true racing speed control, so none of these models is available with one.

Radio	Part no.	Options included	List \$	Street \$
Airtronics				
Caliber 3Ps	90200FM**	2 94102 servos	\$449.95	\$265
	90204FM**	1 94145 servo	\$549.95	\$325
	90205FM**	TX Ni-Cds, 1 94155 servo	\$609.95	\$360
	90206FM**	TX, RX Ni-Cds, 2 94156 servos	\$779.95	\$460
	90047FM**	2 94102 servos	\$299.95	\$170
CS2P	90045FM**	2 831 miniservos	\$319.95	\$190
Futaba				
3PJ Magnum	#PJF**	FM module, receiver, no servos	\$499.95	\$300
	3PJ9101IN**	PCM module, receiver, 1 9101 servo	\$679.95	\$390
3PB Magnum	3PB9304**	2 9304 servos	\$619.95	\$350
	3PB132H**	2 S132H servos	\$539.95	\$320
2PDF Magnum	2PD132FM**	2 S132H servos	\$349.95	\$205
	2PD9304FM**	2 S9304 servos	\$429.95	\$235
3UCP	3UCP9301**	2 S9301 waterproof servos	\$634.95	\$380
JR				
R-756	JRP3TX	No TX module, receiver, or servos	\$329.95	\$205
	JRP30**	FM, no servos	\$479.95	\$300
	JRP32**	FM, 2 507 servos	\$499.95	\$315
	JRP38**	FM, 1 4735 ball-bearing servo	\$579.95	\$365
	JRP31**	PCM, no servos	\$519.95	\$330
	JRP33**	PCM, 2 507 servos	\$539.95	\$340
	JRP39**	PCM, 1 4735 ball-bearing servo	\$599.95	\$375
X-756	JR3TX2	No TX module, receiver, or servos	\$329.95	\$210
	JR34**	FM, no servos	\$439.95	\$280
	JR35**	PCM, no servos	\$479.95	\$300
KO				
EX-1	KOPK10	No servos; KR291 FM RX	\$299.99	\$220
EX-10	KOPK15	No servos, R291 FM RX	\$389.99	\$265
Precious	KOPK15	No servos, R294 FM RX	\$379.99	\$249.99*

* Prices subject to change.

** replace the two asterisks with 27 or 75, depending on the frequency band you want.

EX-1. This is the second generation of KO-Propo's* first "high-end" transmitter. Sharing its case with the Precious, the EX-1 is a 3-channel FM system that features good ergonomics, a battery-level meter, a "panic" brake button and a built-in adjustment screwdriver.

The EX-1's range of adjustments include dual rate, sub-trim, exponential for both throttle and steering, end-point adjustment for throttle and steering and channel reversing.

All adjustments are made with



potentiometers that are protected by a sliding door from accidentally being changed. The radio's third channel is controlled by a dial on the transmitter's face. As with the Precious, owners have



a choice of several colors for grip and throttle-trigger pads.

EX-10—basically, a joint venture of KO-Propo and JR. It looks identical to and has the same features as the JR-756. For more information on the EX-10's features, refer back to the section on the JR-756.

Precious EX-1—KO's top-of-the-line radio system. As well as having all the typical high-point and sub-trim features, its standard features include: programmable reverse functions, variable trim rates, LCD display contrast, beeper-pitch shift (changes the tone of the beep), model select with 6-model memory, model naming, trim positions and trim warnings. Its six-button keypad allows you quick and easy access to all

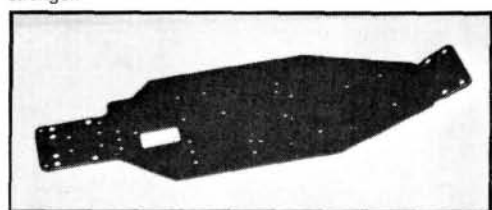
its features. Unique to the Precious EX-1 is that it comes with electronic trim levers ("Electrim") that offer digitally "stepped" trim operation for more precise setting control. An LCD gives all the vital information, and an analog battery meter tells you when your batteries are getting low. Molded rubber pads on the handle and trigger are comfortable to grip. Digital operation on the rotary grip dial underneath the wheel allows precise control of steering travel or trim, throttle/brake, or traction control. The button switch (also underneath the wheel) can be programmed to set the timer and lap-counter functions with a simple push of the thumb. For comfort, the Precious EX-1 comes with an adjustable trigger to accommodate small and large fingers.



*Addresses are listed alphabetically in the Index of Manufacturers on page 184. ■

#5000 ALUMINUM CHASSIS FOR RC10GT

This aluminum chassis for the Associated RC10GT is designed to be incredibly stiff, providing less flex than the kit-supplied chassis. Made of aircraft quality aluminum, the chassis is resistant to all racing fuels. The new flat design allows dirt to escape, keeping it from getting trapped in the chassis. This chassis weighs slightly less than the original, but is much stronger.



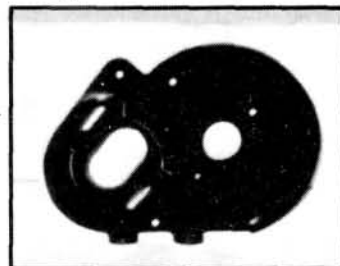
Introductory Retail Price: \$45.95

The #5000 aluminum chassis will not bend or lose its shape under severe impact.

#4750 MOTOR MOUNT PLATE

This new motor mount plate is specially designed for the Associated RC10T2. It is much stronger than the original and helps cool your motor during run time. The plate is the same weight as the stock plate.

This new mounting plate is machined to assure proper gear alignment for maximum transfer and features a flow-through cooling system. This system allows the motor to breathe, increasing run time, power and motor life. #4700 for RC10 and RC10T.



#4750 Retail Price: \$31.95

#4700 Retail Price: \$29.95



P.O. Box 630 Canton, MA 02021

Phone/Fax: 508-587-0663



Project Formula

Part 3: Straight from the

by MIKE OGLE

IN THE LAST installment of this series, to evaluate its handling and check that all the running gear was working, I ran our "test bodied" Benetton around the track for a few laps. This time, I wrap things up by pulling Project F1 into the paddock for a fresh body, some new aerodynamics and a blue "Michael Schumacher" '95 Benetton paint scheme.

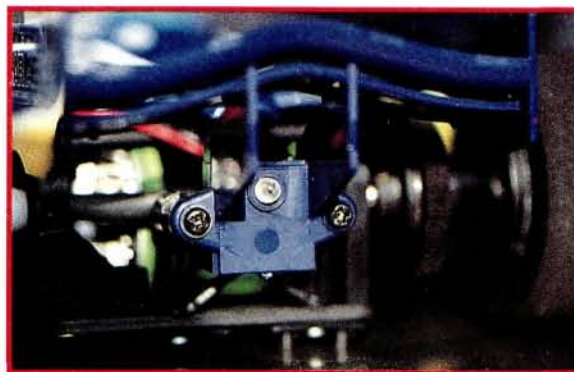
Of course, I also add a few other goodies to make a really deluxe package: authentic BBS wheels, a working rear brake-light kit and even underbody spark generators to simulate the body-scraping spark-flying action seen on those older European tracks.

FINAL BODYWORK

The interesting, Benetton B-195 "Mild Seven" two-tone blue-and-white scheme can be achieved with a lot of well-planned masking. It isn't the easiest paint job in the world to duplicate, so I was really glad when Tamiya* released their B-195 body kit complete with correct large-sideboard rear wing and a full set of scale decals. They're of Tamiya's usual

excellent quality and complete right down to the driver's "Sabelt" seat-belt markings. The three-piece Tamiya B-195 body (body, nose cone and intake cowl) is about as realistic as you'd ever want, but the entire body kit is pricey, and if you're more of a racer than a hardcore scale-realism enthusiast, it may not be what you're after.

I chose to use a less expensive, one-piece Protoform* B-195 body. Although the multi-piece Lexan bodies are more realistic and allow the creation of "undercuts" that are just plain impossible with a one-piece, single-pull body, they are more delicate and susceptible to being damaged. Protoform's Dale Epp knows just the right way to nip and tuck a Lexan body to make it hug an R/C car's less than perfectly scale racing chassis and give it some real handling advantages—without ruining the body's scale looks.



A rear brake-light kit was installed just to keep those annoying high-nose Williams cars off our tail.

If you compare the Tamiya and Protoform bodies, you'll see that the Tamiya has more detail, especially around the rear-suspension fairing "wings" and around the driver's cockpit. The Protoform is more rounded and aerodynamic, and its nose is more drooped—designed to be used with the Ferrari 412T front wing (Tamiya part no. 50543). Both bodies exactly reflect the design philosophies we've come to expect from these two companies—one an internationally renowned plastic-model kit manufacturer and the other a race-driven body manufacturer with an uncanny knack for realism.



The new Tamiya B-195 body kit provided many of the finishing touches, including the large-sideboard rear wing.



Kyosho's Spark Generator Kit adds excitement to any unplanned, off-track excursions. Replaceable flints are just like the ones you can buy for some cigarette lighters.

PHOTOS BY MIKE OGLE

With its new '95 Benetton bodywork, R/C Car Action's Project F1 is ready for the start of the 1996 racing season—under new ownership.

1



Paddock to your garage!

**WIN
this car!**
Just fill out the entry form
on the next page.



Tamiya's BBS wheels are unmatched in the scale realism department. To add "depth," thinned black paint was flowed into the spokes. The wheels aren't just for show—especially when skinned with HPI J-rubber compound tires.

Even with such a complete set of decals, you still need to do a little painting. I did something fairly unusual in that I applied the decals *first*, before I painted the body. Why? Well, the decals cover just about 50 percent of the body and positioning some of the striping would be difficult, if not impossible, to match exactly with the paint. So I put the decals on first using Autographics* Sticker-On spray, and then I filled in the "blank" clear areas with Pactra* paints. The lighter blue on the nose and front wing is a 2:1 mixture of Blue Dust and Candy Blue. The main body color—a darker blue—is Blue Streak mixed with a few drops of Outlaw Black. The driver's helmet came from the HPI* Chassis kit, and the driver's suit and compartment details were all painted on the outside for a more correct "flat" finish.

MORE NEW WHEELS

We switched Project F1's 1/10-scale wheels and tires to the standard size purpose-built F1 rolling stock mainly because we wanted to take advantage of all the available tire/wheel combinations for these cars.

- For parking-lot racing, we chose a set of Pro-Line F1 Hawg rubber radials with high grip and an aggressive tread pattern.
- For smooth-track racing, we're including the latest Jaco* foamies in Pink (medium-soft), Green (medium) and Blue

(firm) compounds.

- For their great looks, we're giving you a set of Tamiya's latest BBS-style spoked wheels (the hands-down winner in the scale realism department) mounted with HPI's J-rubber.

If you're the lucky racer who gets the complete Project F1 package, you'll be able to dial in to most tracks.

JUST FOR THE FUN OF IT...

We couldn't resist a couple of strictly-for-cool accessories. After being rearended a few times during our initial shakedown runs, we added a rear brake-light kit (Tamiya no. 53074). This amazing little circuit-board/light assembly is wired into the motor leads and lights up the single rear taillight when you're in neutral or braking. It looks great, especially during those late

JR's Python radio will be included in the Project F1 giveaway. It's light, comfortable to use and provides glitch-free control.



afternoon/evening Mains, and it consumes only a tiny bit of battery power doing it—not nearly enough to notice on the track.

Also irresistible are Kyosho's no. 1857 Spark Generators. If you've seen full-size F1 racing on TV in the past few years, you've probably seen the cars sparking when their exotic bodywork bottoms out on the tarmac. The spark generators are small flint holders that don't do a darn thing unless you get into a rough part of the track (or go completely off the track), and then they send off a small shower of



The aerodynamic "turning vanes" are included in the Protoform B-195 body kit. Like the high noses on some of these cars, the turning vanes come, go and change shape almost race to race.

PROJECT FORMULA 1, PART 3

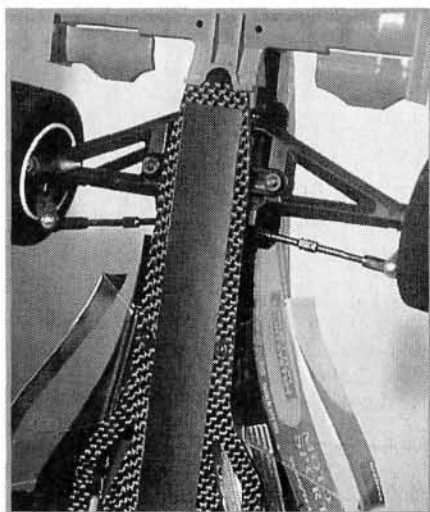
sparks—just like the real F1s do. Again, this looks really great in the evenings.

THE WHOLE ENCHILADA—TO GO!

As promised, we'll pack up Project F1 and all of its accessories and give it away to some loyal *Car Action* reader. What do you get with the basic car? Here's a partial list of what the package includes:

- JR* Python NES-S10 steering servo.
- Tekin* Formula 10 ESC.
- Jaco tires: Pink, Green and Blue compound pre-trued foams.
- Pro-Line F1 Hawgs rubber radials.
- HPI J-rubber.
- Tamiya BBS wheels.
- Peak Performance* Formula 1 stock 24-degree motor.
- AstroFlight* 6- to 7-cell digital battery charger.
- Trinity battery pack

*Addresses are listed alphabetically in the Index of Manufacturers on page 184. ■



Hey, what's this plank of wood doing here? Believe it or not, you'll find such planks on the full-size F1s to keep their ride height at a specified minimum. If, when they pull in after a race, the plank isn't still 10mm thick, they're disqualified!

Win in the Radio Control Car Action Project F1 giveaway!

You could be the proud owner of this awesome, customized HPI F1. It will arrive at your home completely ready to run with radio gear, battery pack and motor. Just charge it up and drive away!

To enter, you must be the first person to answer all five of the following F1 "racing trivia" questions correctly. The answers may require a little research, but we think it will be worth the effort. Hurry! Complete the entry form below, and send it to:

Project F1 Contest, Radio Control Car Action, 251 Danbury Rd., Wilton, CT 06897-3035.

Faxed and e-mailed entries will not be accepted. The winner will be announced in the October '96 issue of *Radio Control Car Action*.

Name _____

Address _____

City _____ State _____ Zip _____ Daytime phone _____

1. Which driver has won the most F1 world championships? _____ 4. When and where was the last U.S. Grand Prix held and where? _____

2. Who was the first F1 world champion? _____ 5. Who is the current F1 world champion, and what is his nationality? _____

3. In which year were turbos banned from F1? _____

PROJECT F1 GIVEAWAY RULES Who may enter: there is no entry fee, and the contest is open to all except employees of Air Age Inc. and their immediate families. **Deadline:** all entries must be postmarked by May 31, 1996. **Judging:** judging will be done by the staff of Air Age. The winner will be announced in the October '96 issue of *Radio Control Car Action*. The winner will be the first entrant to answer all five questions correctly. **Restrictions:** some state and local restrictions may apply. The entrant hereby agrees to assign all of his/her rights, title and interest in submitted questionnaire to Air Age, and such questionnaire shall belong to Air Age. The entrant also agrees to allow publication of the answers for editorial and advertising and use on packaging or products. Submission of an entry automatically constitutes the entrant's acceptance of all conditions set forth in the above rules. Contest is subject to all federal, state and local laws and is void where prohibited.



GIVE YOUR CAR A BRAKE!

Shed some light on your driving experience with real brake lights! With the introduction of Brake Light Circuitry in the Explorer Sport Speed Control™, Team Novak is releasing a new accessory item...the Brake Light LED Kit.

Are you looking to make your car or truck more realistic? **STOP** your search! The Brake Light LED Kit (Part #5655) is what detail-oriented drivers need to achieve that authentic look. Perfect for *Touring Class*, *Formula One*, or any vehicle that would stand out with the addition of brake lights.

Complete with everything needed for quick and simple brake light hook up, the Novak Brake Light LED Accessory Kit is here to give your car a brake!



RACER^{EX}

I'D LIKE TO THANK...

You've stepped up to the competition, conquered all, and start reading your victory speech...I'd like to thank the Team Novak RACER-EX HYPERFET ESC.



Sure you liked the Racer before but check it out **now**. With the addition of **HYPERFET** transistors in the **Racer-EX** (Part #1655) you'll be able to experience lower on-resistance, a higher rated current, and tougher braking power than even the Hammer Pro! All at the same original Racer price. The **NEW RACER-EX**, made for Expert Racing.

ESC COMPARISON CHART

	Racer	Racer-EX
On-Resistance (mΩ) [†]	3.0	1.4
Rated Current (max A) [†]	300	350
Braking Current (A) [†]	120	140
Transistor Type	MEGAFET	HYPERFET

[†]Transistors rating at 25°C junction temperature.

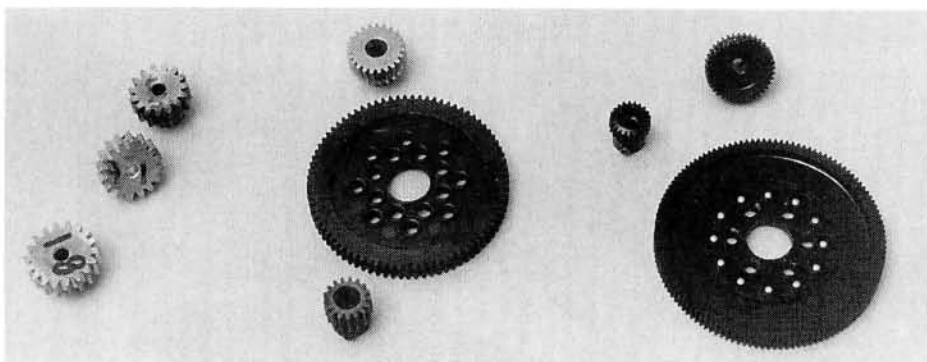
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Advertisement

HOW TO

Make Gears Last Longer

The secret of tooth youth



PHOTOS BY DOUG MERTES

Which is right for your R/C application: 32, 48, or 64 pitch?

by DOUG MERTES

WHHIRRRRR...WHIRRRRR...WHIRR...
aaacckkk...whirr...whirr...
aaacckkk...aaacckkk...cruunncchh!

Anyone who has raced R/C cars and trucks knows these sounds: the quiet "whirr" of nicely meshed transmission, spur and pinion gears and the occasional grinding of a spur gear or transmission in its final death throes. That grinding isn't a pretty sound, and sometimes, there's nothing you can do to prevent it from happening to you. But most of the time, all it takes to keep the teeth on your gears where they belong is a little observation and general maintenance.

In the R/C hobby, we use three gear-

tooth sizes: 32-, 48- and 64-pitch. These refer to the number of teeth per inch of circumference on the face of the gear. (This is why metric 32- and 48-pitch gears, such as those found on Tamiya cars, are different from SAE pitch.) The teeth on a 64-pitch gear are about half the size and depth of the 32-pitch gears found on most entry-level buggies and trucks. Why do we use different pitch sizes?—primarily because larger gear teeth are stronger. For situations in which exact gearing isn't that important (such as with low-timing electric motors that have broad powerbands), 32-pitch stuff works just fine. It's also much easier to

set the correct gear mesh with 32-pitch gears; many beginners find this task difficult to understand. Most gas-powered cars and trucks use 32-pitch gears, because they're strong enough to stand up to the pounding and impact that a heavy, fast gas vehicle's drive train must endure.

On the other hand, 64-pitch gears work much better in situations in which there is less drive-train violence and a lower level of impact-type stress and in which exact gearing is critical for maximum performance. Such applications include roadcourse, carpet, concrete, asphalt, carpet oval, Formula 1 and 1/12-scale racing. The higher-performance stock and modified motors used in these forms of racing demand the kind of precise gearing that's afforded by 64 pitch. Although I've known folks who run 64-pitch gears off-road, they're few and far between. They have to be absolutely paranoid about getting dirt and small stones in the gears, and they always use a gear cover on their transmission. They also tend to change spur gears every couple of heats; that's not cheap!

That's why 48-pitch gears are also very popular—mostly among the off-road and parking-lot set; they're a good compromise between the strength of a 32-pitch gear and the gearing latitude of a 64-pitch gear. You can collect enough 48-pitch spurs in different sizes (from 66 to 90 teeth) to come up with just about any gear ratio you'd like. The 48-pitch gears are more resistant to chipping and premature wear than 64-pitch gears, and that's important when you're trying to clear those awesome triple jumps and don't...quite...make it.



The gears need to mesh closely enough to provide ample tooth-to-tooth contact, but not so tightly that they bind.

If the guys you run with tend to whack your pan car or F1 ride in the rear end from time to time, you'll find that 48-pitch gears will usually survive to the end of the heat. Yes, they're louder (they produce more gear whine than 64-pitch gears), but I'd rather be loud and survive the race. On my parking-lot Formula 1 cars, I always use 48-pitch gears.

Are there any secrets to prolonging the life of the teeth on your spur gears? Not really—as long as you pick the right gear for the application. Just follow these simple rules: set the gear mesh properly; tighten the motor screws correctly; and keep the gear-meshing area clean.

SET THE MESH

I hang around a lot of R/C racers—from very experienced guys to entry-level newbies. Many have a really hard time setting gear mesh properly. Like anything worth doing right, this takes patience and a little time. I set the mesh very carefully and check it two or three times to make sure it's right; as a result, I almost never lose a spur gear. In fact, I can't remember the last time I didn't finish a race because of a gear problem. No, I'm not a perfect driver (some people say I drive using the "Braille method": I have to touch every corner on my way around the track!), but unless you're hit directly on the spur

gear, or get a small stone lodged between the spur and the pinion, you'll find that correctly set spur gears are very durable.

The gears need to be meshed tightly enough to provide ample tooth-face-to-tooth-face contact to bear the load of the drive train. Remember that at any given time, the entire weight of the truck or car, multiplied by acceleration and deceleration forces, impacts, hits from other drivers, etc., can bear down on the surface-to-surface contact of that one little set of meshing pinion/spur gear teeth. Help them out by getting as much tooth-face contact as possible.

On the other hand, meshing the gears too tightly will reduce their efficiency, make the motor run hot and cut down on run times. It will also kill your spur gear, because

with enough pressure, the metal pinion teeth will cut right through the plastic spur gear teeth. They'll reduce the height of the spur teeth and deepen the pitch valley at the same time. This can produce a worn-out or out-of-round gear in just a few laps.

The ideal mesh (regardless of pitch) is one that brings the tooth of one gear down into the valley of the meshing gear as far as possible without binding up. With the proper mesh, the spur gear will rock back and forth just a teeny bit when engaged with the pinion. The 32-pitch gears require slightly larger mesh clearances than 48-pitch gears. The 64-pitch gears need just an itty-bitsy bit of rocking action when everything has been tightened down. Some tuners recommend the use of a piece of cellophane, plastic wrap, or paper between the spur and pinion. Slide it in there, mash the gears together, and tighten the whole mess up. Pull out the paper/plastic spacer, and the mesh should be set properly. It isn't very elegant, but it's probably a good way to start out. Do it that way a few times, and after a while, you'll get a feel for the proper gear spacing.

TIGHTEN THE MOTOR SCREWS

This seems simple, but many racers forget this step: use the proper tool, and tighten the motor screws down well. You *are* using 3mm motor screws, aren't you? You'd be amazed at the number of people who think that the proper motor screw size is a 4-40 socket head. These screws will *kind of* work, but they're actually cross-threading the mounting holes in the motor. Sooner or later, those 4-40 screws will loosen and your spur gear will be history! So make sure that your screws are 3mm. The socket-head size will be different from those other 4-40 screws on your car or truck. Use a 2.5mm Allen wrench to snug them down tightly, and put a flat washer under each screw to prevent the screw head from distorting the motor-mounting plate after it has been tightened down.

Which kind of motor wrench do you use? I used to have a great T-handle 2.5mm wrench (the proper size for a 3mm socket-head screw), but apparently, someone else liked it as much as I did and walked away with it! It was a genuine Allen-brand wrench, of a type they don't make any-



These motor screw wrenches do the job. Find one that's right for you! Be sure to use 3mm screws—not common 4-40 screws—to attach your motor.

Rollout Gearing Revealed!

the distance that the rear tire travels in one revolution in relation to one revolution of the motor. Regardless of spur size, pinion size, or tire size, rollout can always be calculated and compared.

First, measure the rear tire that's mounted on the car. Calipers are the best tool for this, and you can find cheap ones for about \$4 or \$5 at most large hobby shops. Use the millimeter (mm) scale for this calculation; once you start converting fractions of an inch to decimals, things can get very confusing. Now, it's time to remember your math:

- Multiply the diameter (height) of the tire by π —a mathematical constant that equals 3.1416. The result is the tire's circumference (or distance) around its outer edge.
- Divide this by the number of teeth on the spur gear.
- Multiply that result by the number of teeth on the pinion gear. That number is your rollout.

For example:

- An F1 car with 55mm rear tires, a 63-tooth Tamiya spur gear and the stock 18-tooth kit pinion. $55 \times 3.1416 = 172.788 \div 63 = 2.742 \times 18 = 49.36\text{mm}$ of tire circumference per motor revolution. That 49 to 50mm area is pretty much where you want to start when you use a stock motor on the parking lot.
- If the tires wear to 53mm during the first three races of the season, how do you adjust the gearing to compensate, so that the car will be just as fast? A 19-tooth pinion will give you a rollout of 50.02mm, which is pretty close—especially for the stock- and closed-endbell motors used by most spec-racing clubs. Use an adapter and a different spur gear, and you can come even closer: a 78 spur and a 23 pinion nets a rollout of 49.09. Isn't this fun?

Now, no matter which brand of car you and your friends run, you can use some simple tools and a calculator to easily compare one another's gearing and its effect on performance. I guarantee you'll go faster!

MAKE GEARS LAST

more—bummer! Now I have a couple of nice motor wrenches that I found while searching for a replacement. Bolink*, Trinity*, Associated* and Thorp* all make great wrenches that will help you get the job done right. Some companies, such as Bondhus, Thorp and Wiha* make wrenches with a rounded tip so you can attack the screw at an angle instead of straight on.

One final hint: when you set the gear mesh, the motor screws should be almost fully tightened down. Leave them just loose enough so you can move the motor in small increments. If one screw is left too loose, the motor will be angled relative to the motor mount. When you tighten the motor down, the mesh will change. Usually, it will become too tight.

GOT YOU COVERED!

This is critical! Every surface has hazards waiting for soft plastic and aluminum gears. Off-road courses are filled with dust, dirt, mud and stones. Parking lots have small pebbles, rocks and abrasive asphalt and concrete dust that's worse than anything else you can expose your stuff to. Even carpet, with its fuzz and rubber dust, can inhibit gear movement. Know this, and be prepared.

Off-road racers absolutely need to run with a spur-gear cover—no excuses. Even though they're mandated by some racing organizations, I've seen a lot of off-road guys run without one. They think it isn't cool, or that it takes too long to change gears or clean their motor between heats; dumb, dumb, dumb! Use a gear cover of the proper size (if the one that came with the kit is too small, check out companies such as RPM*

and Parma* for larger replacements), and take the time to make sure that it fits properly around all the edges. No matter how careful you are, you'll get some dirt and dust inside the case, but if you can keep the boulder-size stuff out of the gears, you're most of the way there.

Parking-lot racers just have to clean their cars as much and as often as possible. Buy an inexpensive 1-inch paintbrush (real-hair brushes last longer). Use it to brush off the entire car—especially the gear and motor area—between runs and heats. You'll be amazed at what comes off your car. If you disassemble the rear axle and ball diff after every full day of running and clean, re-lube and adjust everything, you'll find that your equipment will easily last an entire season.

Carpet racers need to do the same thing, but between each run, you also must take a very careful look at the gears, shafts, axles and bearings. That nasty carpet fuzz will get into almost anything that spins, turns, or has even a slight coating of grease or oil. Carpet hair can interfere with your differential setup (it gets into the balls), but if it gets into the gear mesh, it will stop your car dead. Keep it clean, or suffer the shame of a thousand fuzzy deaths!

IS IT DEAD YET?

OK; you've taken the pledge, and you're going to be good from now on. How about the equipment you have? Is it already worn out, or is there some life left in it? Even the best maintained gears will eventually wear out (hey, they're plastic, right?), so you'll need to know what to look for.

A gear that's in good shape usually has a "squared off" tip on its teeth. Take a new, dark-colored spur gear and place it on a white sheet of paper, and you'll see what I mean. As the teeth become worn, the tips become more pointed, because the teeth are starting to wear at the face. The valleys between the teeth will get a little wider at the top and sometimes get deeper. As the teeth get weaker, they become worn down to a curve. Even pinion gears, especially soft aluminum pinions such as those found on Tamiya street cars, will begin to take on this shape after a while. Never use a pinion that has worn to this point; you'll just destroy whichever spur gear you match it with. Toss it and replace it. Once the teeth on a spur gear have started to "curve," it's only a matter of time before they'll start to pop off.



Protect your off-road gears by using a gear cover. These paintbrushes and toothbrushes will keep the meshing area clean on any R/C car or truck.

When that happens, they'll come off one after the other, until a whole row has gone. The chattering you'll hear will be the sound of your spur gear saying goodbye.

TRANSMISSION GEARS

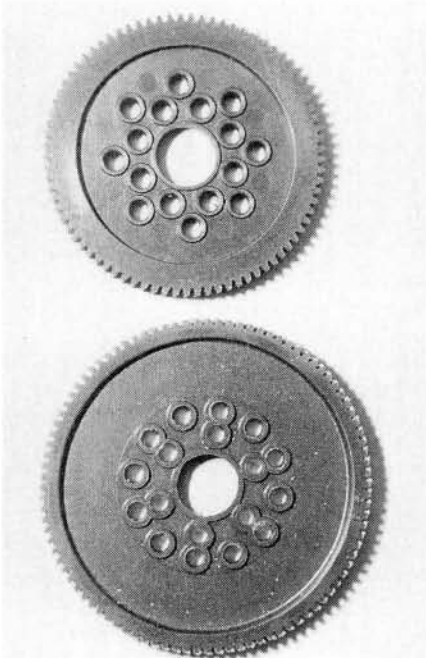
A lot of what you've read here about spur and pinion gears also applies to the gear teeth inside your car or truck's transmission. Of course, you don't really set the mesh on those gears, and you don't ordinarily have to make a decision about which pitch to use. Because they're enclosed in the tranny, these gears stay relatively clean, so dirt and dust contribute less to gear wear. Still, there are a few rules to follow:

- Most modern transmission gears do not require lubrication; in some cases, it would inhibit differential operation, or slow the car down. I know some racers who use a little Paragon* Ultralon between the spur and pinion; they claim that it reduces gear whine and prolongs gear life. Cars that do require gear lubrication, such as those in Tamiya's TA02 series, can benefit from AeroCar's* Super Speed Gear and Diff Lube (the slimy pink stuff). This has consistently produced the most free-running Tamiya gearboxes I've ever built. Jack Johnson at Team Losi feels the same way about using this stuff on Losi transmission gears.

- Take the transmission apart a couple of times per season, clean out the dust and dirt, inspect the gears, and reassemble it. If a problem is starting to happen, you'll know it by the shape of the gears.

- Listen for unusual gearbox noise. If you hear anything strange, stop your car and check it out. Don't continue in hopes that the noise will just go away. The only time it will truly go away is when you coast to a stop—long before the finish line!

* Addresses are listed alphabetically in the Index of Manufacturers on page 184.



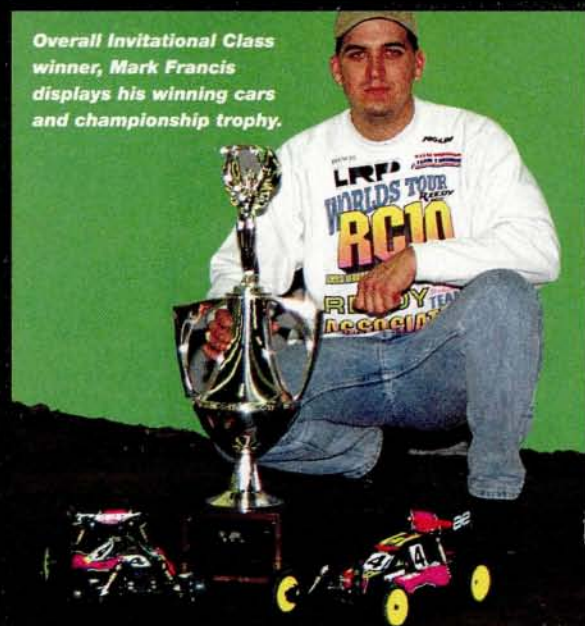
Check out the difference between the new gear (top) and the worn-out gear (bottom).



Invitational-class drivers.



Overall Invitational Class winner, Mark Francis displays his winning cars and championship trophy.



ANNUAL REEDY INTERNATIONAL RACETOPHIA

by GEORGE M. GONZALEZ

IT'S HARD to believe that the Reedy Invitational Race Of Champions is now celebrating its 10th anniversary. I can still remember the first Reedy Race, which was held at Hot Tracks in Huntington Beach, CA, back in 1987. Back then, nobody knew that the Reedy Race would become an annual event and that, one day, it would be perhaps the most prestigious international off-road event—after the IFMAR World Championships.

The Reedy Race is actually a giant birthday party in Mike Reedy's honor, and for the 10th straight year, racers from all over the world came to join in on the festivities.

HERE'S HOW IT WORKS

There are two classes: Invitational and Open. Invitational class drivers must be invited, and there are two ways to get on the list:

- by doing extremely well in the previous year's IFMAR-sanctioned races. The U.S. drivers qualify by making the A-Main at the ROAR Nationals or IFMAR Worlds; European and Japanese drivers qualify by finishing well in the EFRA and FEMCA championships and the IFMAR Worlds.
- by winning the A-Main in either the 2WD or 4WD Open class at the previous Reedy Race.

The Open class is open to all racers, but is limited to 200 entrants—for obvious reasons.

Invitational drivers must first race six heats in 2WD and then six heats in 4WD—12 heats total. Oh, and did I mention there are no qualifying rounds? That's right! The racers face six Mains in each class without qualifiers. The Invitational drivers are then awarded points according to their finishing positions in each of the 12 heats (first place = 1 point, second place = 2 points, third place = 3 points, etc.). The drivers' worst heat in each class is discounted and taken into consideration only in the event of a tie-breaker. So only 10 of the 12 heats count, and the driver with the fewest points wins.

Open-class drivers may race in 2WD or 4WD, or both classes if they like (in no way is it mandatory, however, that the Open-class drivers race in both classes, and no points are awarded for their finishing positions). Open drivers face four qualifying heats, and the winners are determined in a single Main. The winners of each Open class are automatically invited to the following year's Reedy Race as Invitational contestants.

The Track

There's no doubt that So Cal R/C raceway in Garden Grove, CA, is becoming one of the most popular R/C tracks in the world; in fact, it won our "Readers' Choice Award."

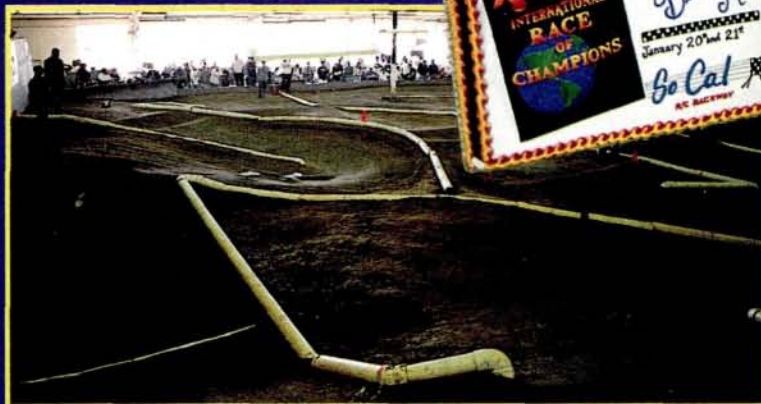
Much of the "hoopla" is because many of the factory Team drivers use the facility as a testing ground for new products. That Brian Kinwald practically *lives* there also adds to its popularity. (I'm told that Brian has his own office equipped with a computer, photocopier, fax machine and his own personal secretary—well, maybe not....)

The main reasons for So Cal's popularity, however, are that its atmosphere is professional and its customer service is excellent. The track's size is impressive, but the challenging layouts are why racers keep coming back for more. It has a well-stocked pro shop, a snack bar, a video arcade and tons of pit tables that all have electrical outlets.

Track owners Jim and Lana Blauvelt did a fine job of transforming the old supermarket into a mega off-road racing facility, and they're always on the lookout for new ways to make R/C racing more fun for everybody. Take, for instance, their "black-light" night racing. One night a week, the main lights are turned off; the black lights are turned on; and the racers drive their glow-in-the-dark cars in heat races. After a while, all you see are multicolored streaks as the cars whiz by—pretty cool. So, if you live in Southern California and

you're looking for a place to race, check out So Cal R/C Raceway; they have a good thing going.

The folks at So Cal R/C Raceway had this birthday cake made up for Mike Reedy.



PHOTOS BY GEORGE M. GONZALEZ & DAN HAYS

CHAMPIONS

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Radio Control
CAR ACTION

REEDY INTERNATIONAL RACE OF CHAMPIONS

OPEN QUALIFYING

• **2WD.** After four exhausting rounds of qualifying, Richard Saxton managed to beat his friend and fellow "Team Squirrel" teammate Scott Hughes by less than 1/10 second. Wes Kasper, Alex Guerrero and Billy Easton all finished on the same lap and were less than 1 second behind Saxton's 13/4:08.24 top-qualifying run. As you can see, the A-Main finalists were evenly matched; and they all had what it takes to win an A-Main. For the record, six Associated* RC10B2s and four Team Losi* Double-Xs made up the A-Main grid.

• **4WD.** The friendly rivalry continued between Scott Hughes and Richard Saxton; this time, however, formidable 4WD racer, Brent Wallace was there, too, and he was gunning for a piece of the action. Wallace seemed to be the driving force until Hughes swiped the TQ away from him in one of

the last rounds of qualifying. Saxton, on the other hand, just couldn't keep up the pace and ended up a full lap behind Hughes and Wallace to take the third spot on the A-Main grid. All 10 A-Main finalists drove Yokomo* YZ-10 buggies.

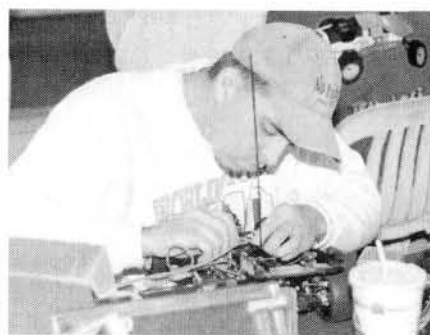
OPEN A-MAIN ACTION

• **2WD.** Thanks to his prime position on the starting grid, Richard Saxton got the jump start, but Wes Kasper and Scott Hughes were right on his tail—which apparently made Saxton a little nervous. The pressure must have been too much for Saxton to because he got a little "wango tango" going through the triple jumps and ended up on his lid. By the time the turn marshal had Saxton's B2 back on all fours, Hughes was in the lead with Kasper in tow. That left Saxton battling Alex Guerrero and Billy Easton for third.

At the 2-minute mark, Hughes got tangled up in a pileup going through the timing-tower turn, and that gave Kasper the chance to get around Hughes to claim first. Hughes was quick to get back in the race, though, and soon took second, while Guerrero moved up to a solid third. Saxton's B2 wobbled around like a ping-pong ball and was punted, run over and tossed all the way to the back of the pack.

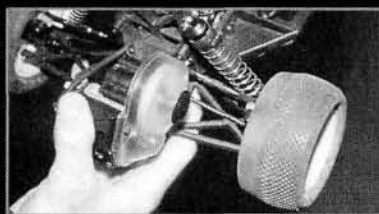
Hughes didn't want to settle for second, so when going over the triple jumps, he successfully made an aggressive, midair pass on Kasper's Losi Double-X. From that point on, Hughes held on to the lead, Kasper stayed planted in second and Guerrero took the show position. At the sound of the buzzer, Hughes crossed the line first to post a 13/4:07.38; Kasper rolled in next with 13/4:09.99; and Guerrero finished third with a 13/4:11.22. Top Qualifier Saxton, who had nothing but problems, wobbled in last. Scott Hughes' first place reserved his spot in the Invitational for the next race.

• **4WD.** After a beautiful start, it was the



Team Associated's Mark Francis prepares for a Main. Consistently good driving earned Mark the overall Invitational championship.

"Squirrel Man" himself, Scott Hughes, who took the lead in a game of follow the leader. Before completing the first lap, Billy Easton caused a pileup, and just about every car ended up on its lid or tangled up against a



Believe it or not, these Pro-Line Square Fuzzies still have life in them.

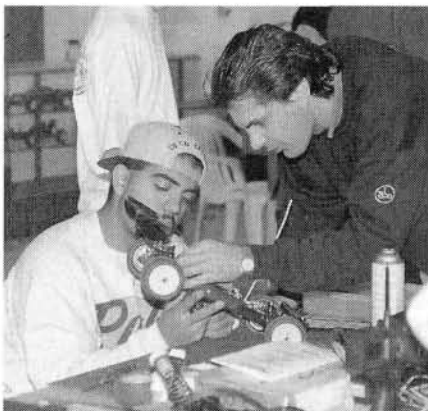
Traction Talk

When I first caught a glimpse of the track at So Cal R/C Raceway, I started to get a case of *déjà vu*. To my surprise, its surface looked very much like that at the Yatabe Arena in Japan—site of the '95 IFMAR World Championships. In the beginning, its surface was damp and loamy, but by Saturday afternoon, it was rock-hard and had a blue groove along the entire course.

The tires of choice were Pro-Line's Square Fuzzies; in fact, over 80 percent of the drivers at the Reedy had them. But what amazed me most was not how many drivers used the tires, but how the tires actually improved with use: the more worn-out the Square Fuzzies became, the better they worked.

Pro-Line's Tim Clark gave me some insight on why this was happening. Apparently, as the tiny square pins get shorter with use, the tire's surface area is gradually increased. In other words, more rubber on the track equals better traction.

Of course, Square Fuzzies don't last forever and will eventually reach a point at which they become unstable or fail to provide traction, but don't you dare throw them out just because they look worn out! They may still have five good runs left on them!



Richard Weatherley, from Tenth Technology, gives Team Losi driver Sohrab Tavakoli a lesson on the Predator 4WD buggy.



2WD Open A-Main winners



4WD Open A-Main winners



Invitational-class drivers

washboard. Easton received a caution and had to go to the penalty box for 2 seconds for his little blunder. Meanwhile, Hughes enjoyed nearly a half a track lead on his nearest competitor.

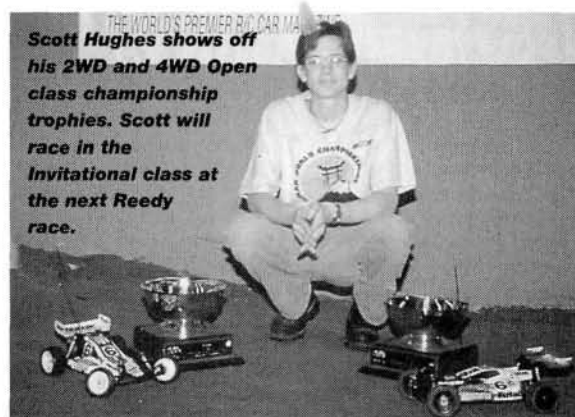
At the 3-minute mark, Todd Cariseo had secured second while John Scott had inherited third. The top three drivers were well-spread-out and were never challenged for the duration of the race. Hughes blazed in first to take the win with a 14/4:15.96; Cariseo came in moments behind to post a 14/4:18.68; John Scott rolled in a full lap later with a 13/4:02.82.

INVITATIONAL

With a total of 48 heats (2WD and 4WD combined), I couldn't possibly provide you with my usual play-by-play (sorry, there's just no room!); so I'll skip the meat and potatoes and get right down to dessert (trust me, you'll thank me later).

• **2WD.** This started on Friday afternoon and continued until Saturday afternoon. If I had to pick the most dialed driver, I think Team Trinity*/Losi factory driver Brian Kinwald would be my hands-down choice. Brian won four heats, placed second in one and threw out his seventh place in the sixth round for a grand total of 6 points and the overall 2WD championship. (This didn't win him any trophies, but it did put him in good shape for the start of the 4WD class.)

Team Associated drivers Mark Francis and Matt Francis and Team Trinity driver Greg Hodapp also ran exceptionally clean races and all tied for second with 7 points.



THE WORLD'S PREMIER R/C CAR MAGAZINE
Scott Hughes shows off his 2WD and 4WD Open class championship trophies. Scott will race in the Invitational class at the next Reedy race.

Team Associated driver Mark Pavidis had 8 points, which also put him in the running for the overall championship.

• **4WD.** This started on Sunday morning and was over by 5:30 p.m. that afternoon.

WINNERS

2WD Modified Open

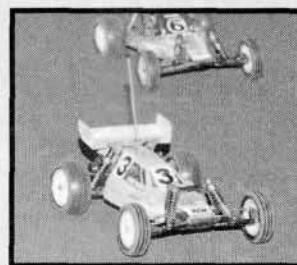
Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction additive	Pinion/spur
1	2	Scott Hughes	Assoc.	Reedy	Reedy/Orion	LRP	Futaba	Assoc.	Losi/Pro-Line	Assoc.	n/a
2	3	Wes Casper	Losi	Trinity	Trinity	Novak	Airtronics	Jammin	Losi/Pro-Line	Trinity	19/84
3	4	Alex Guerrero	Losi	Peak Perf.	Orion	Novak	Sanwa	Jammin	Losi/Pro-Line	n/a	19/84
4	5	Billy Easton	Assoc.	Reedy	Reedy	Tekin	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	19/81
5	6	Collin Macrae	Losi	Peak Perf.	Orion	n/a	Airtronics	Jammin	Losi/Pro-Line	n/a	18/84
6	7	Jimmy Babcock	Losi	Maxtec	Maxtec	Novak	Airtronics	Jammin	Losi/Pro-Line	n/a	19/84
7	9	Chad Bradley	Assoc.	Race Prep	Race Prep	Novak	Airtronics	Assoc.	Pro-Line/Pro-Line	Assoc.	20/81
8	10	Chris McElroy	Assoc.	Reedy	Orion	Tekin	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	18/81
9	8	Steve Chamberlain	Assoc.	Peak Perf.	Orion	Novak	Airtronics	Assoc.	n/a/Pro-Line	Assoc.	20/84
10	1	Richard Saxton	Assoc.	Reedy	Reedy	Novak	Airtronics	Assoc.	Losi/Pro-Line	Assoc.	17/87

4WD Modified Open

Fin.	Qual.	Driver	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction additive	Pinion/spur
1	1	Scott Hughes	Yokomo	Reedy	Reedy/Orion	LRP	Futaba	Yokomo	Pro-Line	Assoc.	n/a
2	6	Todd Cariseo	Yokomo	Reedy	Reedy/Orion	Novak	Airtronics	Yokomo	Pro-Line	Assoc.	18/87
3	5	John Scott	Yokomo	Peak Perf.	Orion	Tekin	Airtronics	Yokomo	Pro-Line	Assoc.	n/a
4	10	Curtis Schlaht, Jr.	Yokomo	Trinity	Trinity	LRP	Airtronics	Yokomo	Pro-Line	n/a	19/87
5	9	Frosty St. Clair	Yokomo	Reedy	Reedy	LRP	KO-Propo	Yokomo	Pro-Line	Assoc.	17/90
6	2	Brent Wallace	Yokomo	Maxtec	Maxtec	Novak	Futaba	Yokomo	Pro-Line	Assoc.	17/87
7	8	Jimmy Babcock	Yokomo	Maxtec	Maxtec	Novak	Airtronics	Yokomo	Losi	n/a	17/87
8	7	Alex Guerrero	Yokomo	Peak Perf.	Orion	Novak	Sanwa	Yokomo	Pro-Line	n/a	17/87
9	4	Billy Easton	Yokomo	Reedy	Reedy	Tekin	Airtronics	Yokomo	Pro-Line	Assoc.	19/87
10	3	Richard Saxton	Yokomo	Reedy	Reedy	Novak	Airtronics	Yokomo	Pro-Line	Assoc.	17/87

2WD and 4WD Invitational

Fin	Total	Driver	Chassis (2WD/4WD)	Motor	Battery	ESC	Tires (F/R)
1	15	Mark Francis	Assoc./Yokomo	Reedy	Reedy	LRP	Pro-Line
2	16	Matt Francis	Assoc./Yokomo	Reedy	Reedy	LRP	Pro-Line
3	17	Greg Hodapp	Losi/Kyosho	Trinity	Trinity	Tekin	Pro-Line
4	17	Brian Kinwald	Losi/Yokomo	Trinity	Trinity	LRP	Pro-Line
5	18	Masami Hirotsuka	Assoc./Yokomo	Reedy	Yokomo	Tekin	Pro-Line
6	18	Gregg Dennett	Assoc./Kyosho	Reedy	Reedy	LRP	Pro-Line
7	18	Mark Pavidis	Assoc./Yokomo	Reedy	Reedy	LRP	Pro-Line
8	26	Jason Ruona	Assoc./Yokomo	Reedy	Reedy	LRP	Pro-Line
9	26	Craig Drescher	Assoc./Yokomo	Reedy	Orion	LRP	Pro-Line
10	27	Rick Hohwart	Assoc./Yokomo	Peak Perf.	Orion	Novak	Pro-Line



New in the Pits

Promotion for Richard Trujillo

Team Losi factory driver Richard Trujillo has been promoted to assistant team manager. He will be taking over many of the day-to-day team-captain responsibilities, such as: keeping sponsored drivers up-to-date on winning setups; making sure they have the right replacement parts and tools to keep them running; and making sure they're well-informed about upcoming races. In short, Richard will assume the role of "dad" and will be the link between the sponsored drivers and the factory.

Richard's promotion will free up team manager, Jack Johnson, who will now be able to do research and development on current and future Team Losi products, write technical articles for various publications, write a monthly newsletter for Losi's sponsored drivers (Richard will help with this), implement advertising and promotional campaigns, and make hotel and flight arrangements for upcoming racing events. Congratulations, Richard, but don't let Jack turn you into his whipping boy!



Rick Hohwart's Futaba T3PJ Transmitter

Rick Hohwart from Peak Performance is one of the lucky three people in the U.S. to have one of Futaba's* new T3PJ transmitters in his possession. This radio has so many hot features that a book could easily be written on all its benefits; in fact, the operating manual is over 70 pages long (this is no joke). Don't let the complexity fool you, though; it's actually very easy to operate, and I'm told that the average R/C racer could be on the track after spending just 10 minutes reading a "cheat sheet."

Here are just a few of this radio's features: an LCD display with six edit keys; 8-model memory with model identification; stopwatch with 99-lap recall; all electronic trims; "assignable" trim tabs; right- or left-hand operation; direct servo control; low-battery alarm; programmable mixing; and throttle and steering dual rates with exponential. (For more information on this incredible transmitter, check out our "Racing Radio Guide" elsewhere in this issue.)

I asked Rick what he thought of this new radio, and he answered with one word—"Awesome." I knew he wasn't kidding because when I asked whether I could hold it, he again had just one word to say—"No." I guess I'll have to get my own.



Special Thanks from Mike Reedy

I'm glad to have this opportunity to thank the people who made this the best Reedy International Race of Champions to date. R/C Car Action and Novak Electronics have been sponsors for several years, and their continued support, not only of this event, but of events throughout the year, is appreciated by everyone involved. Without the support of sponsors such as these, events such as this would not be possible.

But, in the end, it's the racers who make a race fun and exciting. This year, the Open class saw some excellent racing and some new names—something I really enjoy seeing. The Invitational class was the closest, most competitive racing I have seen. It all came down to the final 12th round, and six drivers had a shot at the championship.

I congratulate Mark Francis for his amazing performance, and I thank all the drivers for the great show of competition and sportsmanship they put on.

—Mike Reedy

Masami Hirosaka was the most dialed. It's a real pleasure to see him in action; he ran an exceptionally clean race and took five first places and one second to become the overall 4WD champion. Unfortunately, Masami had some bad luck in 2WD and ended up with 13 points, which foiled his chances of finishing strongly. His score eventually totaled 18 points, which gave him fifth place overall.

Mark Francis took three firsts, one second and one third for a total of 8 points. Combined with his 7, 2WD-class points, these gave him 15 points overall—the lowest score and the overall championship. Way to go, Mark!

Matt Francis placed first and second twice and third once for a total of 9 points. Added to his 7, 2WD points, this gave him 16 points and the second-place trophy. Wow! The Francis brothers swept the Reedy Race—talk about a family affair!

The Trinity brothers, Brian Kinwald and Greg Hodapp, tied for third with 17 points, but Greg had a better toss-out round, so he took third, and Brian had to settle for fourth.

WRAPPING IT UP

The 10th Annual Reedy International Race of Champions was a complete success. It

Greg Hodapp Switches Sides

Have you heard that last year's Invitational winner Greg Hodapp is now driving for Team Trinity? He will continue to drive Team Losi cars and trucks, but he will use Trinity batteries, motors and accessories. I talked to Greg about his recent switch, and here's what he had to say:

GG: Why did you switch?

GH: I thought that a change would do me good, and Trinity manufactures products that are sure to make me faster.

GG: You have all Team Losi's resources at your disposal, and now you have Trinity's, too. Will this make a huge difference to your performance?

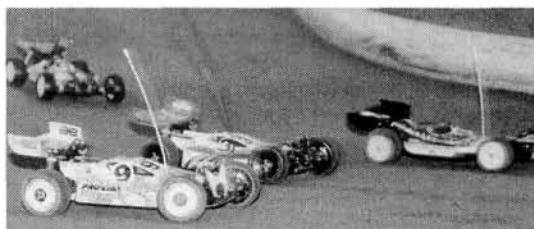
GH: I hope so. The fact that I'll be racing with my good friend and fellow teammate Brian Kinwald should make me go faster. Brian is a good motivator. Trinity has a lot to offer, and I know it will make a difference when the trophies are passed out.

GG: So where do you go from here?

GH: I don't know...Disneyland? Actually, I plan to dedicate myself a lot more, and I hope that one day soon, I'll be just as fast as Brian. Who knows? Maybe I'll be faster.

GG: So how is Brian adjusting to all this?

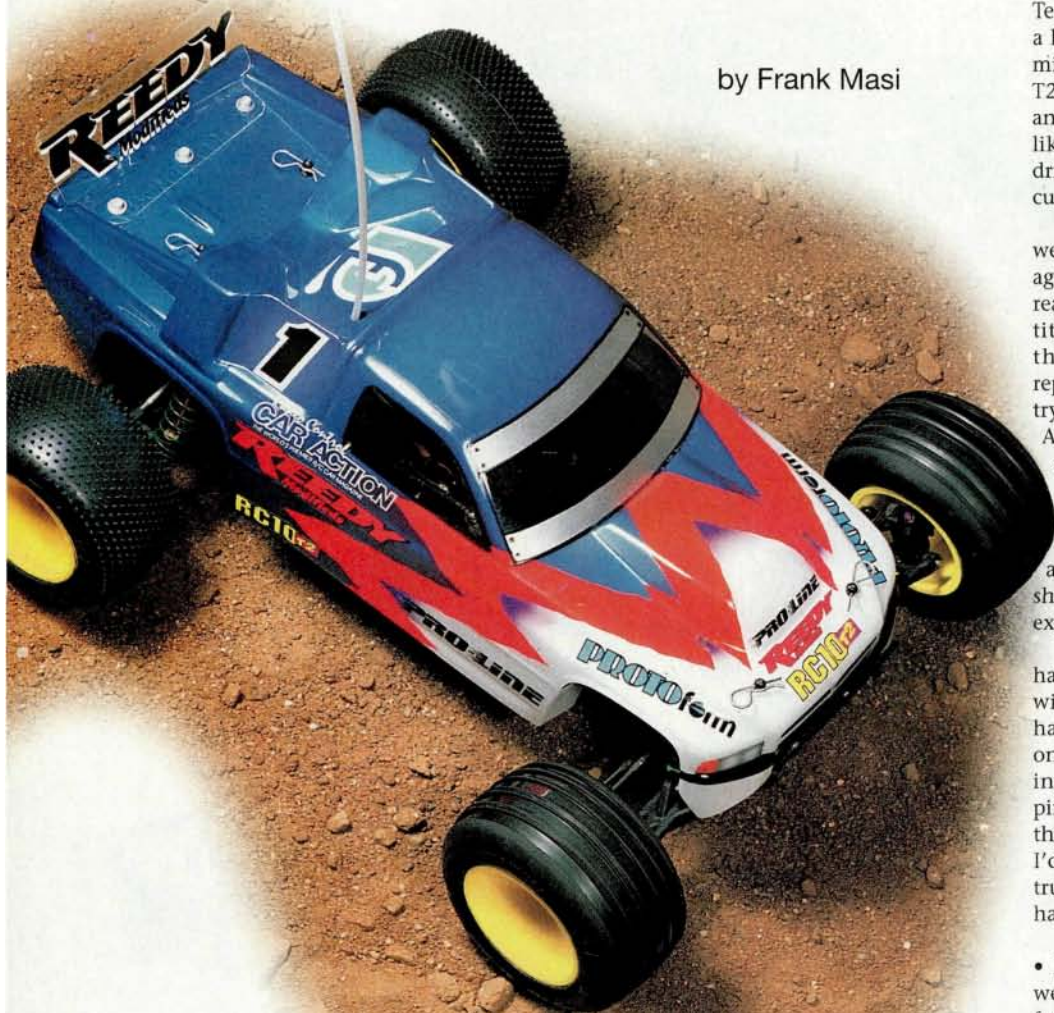
GH: I think he's adjusting just fine, and I think he's happy because now the pressure is on both of us, not just on him alone.



was also the most action-packed Reedy Race to date. In the Invitational class, the action was so tight that the championship wasn't decided until the final round (that's what racing is all about). It was a pleasure (as always) to watch world champion Masami Hirosaka skillfully pilot his Yokomo YZ-10 with surgeon-like precision in the 4WD class, and it was also great to see Mark Francis at last win a "a big one." (I mean this in the nicest possible way because Mark Francis is one of the most dedicated and determined racers out there, and he's also a heck of a nice guy!) I also congratulate Scott Hughes for his fantastic performance in both the 2WD and 4WD open classes; and who knows?—maybe, one day, he'll fill me in on all this "Team Squirrel" stuff. See you all next time.

*Addresses are listed alphabetically in the Index of Manufacturers on page 184.

by Frank Masi



Tuning and
modifying the

ASSOCIATED

RC10T2

WHEN I reviewed the Team Associated* RC10T2 back in the September '95 issue, I had put it through five weekends' worth of racing abuse. Eight months and 30 races later, the T2 is still going strong. As we take a "2nd Look" at Associated's top-line racing truck, I'll show you which mods made it perform even better and tell you how well it held up during almost nonstop competition.

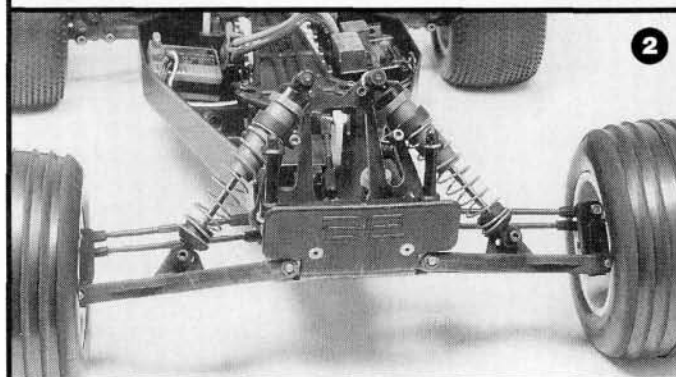
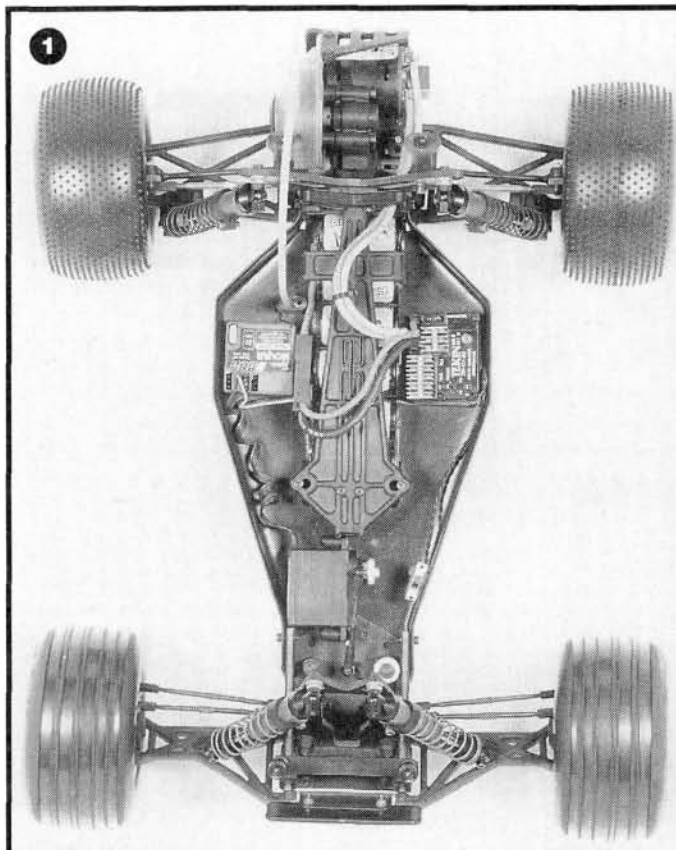
• **Tie-rods.** The first modifications made were done more out of necessity than by intention. After the "Thrash Test," I was racing at a track that had a large set of double jumps. During a missed attempt at clearing them, the T2 came down on one rear wheel, and the stock, steel, rear tie-rod bent like a pretzel. As the rod bent, the drive shaft was forced into the drive cup and was also bent.

Obviously, the tie-rods were the weak link and the cause of the damage to the drive shaft. I replaced both rear tie-rods with Lunsford* Punisher titanium turnbuckles. While I was thinking about buying a set of replacement drive shafts, I decided to try a pair of MIP* CVD drive shafts. Although I can't prove this, CVDs are supposed to allow the suspension to operate a little more freely than the stock U-joints. Plus, the CVDs can be rebuilt, so if I bent another, I'd just have to buy a new shaft and not an entirely new set of expensive drive shafts.

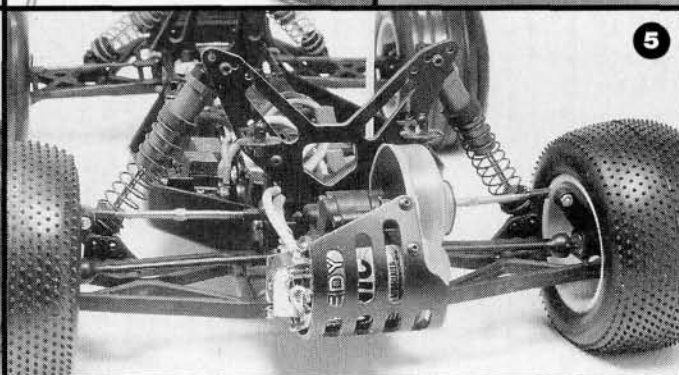
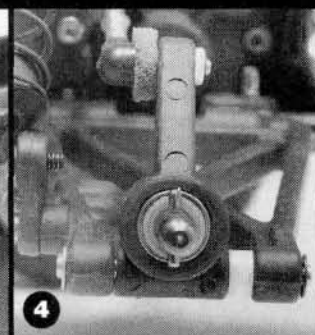
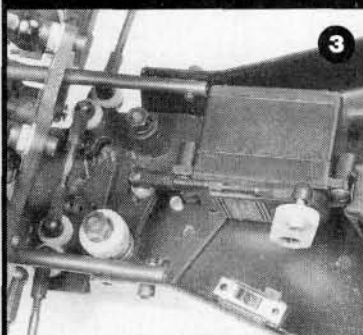
So far, the Punisher tie-rods have handled all sorts of off-road mayhem without a squabble, and the CVDs have been equally trouble-free. The only shortcoming I've noticed is that installing and removing the drive pins is more difficult with the CVDs than with the stock shafts. Although I'd like eventually to fit the entire truck with the Punisher rods, I really haven't needed to do so yet.

• **Hinge pins.** After two or three weeks of racing, I removed the T2's front shocks for a rebuild. With the shocks removed, I noticed that the front suspension arms had a lot of binding. Both inner hinge pins were severely bent. I replaced the pins with a new pair of stock steel ones, which cured the problem. Curiously, the new hinge pins have held up fine. I have to chalk this up to that big jump that claimed my tie-rod and drive shaft!

• **Shock shafts.** Although there's nothing wrong with the stock shock shafts, I decided to replace them with a full set of MIP Gold shafts. These shafts are coated with titanium nitride and are much more resistant to wear and scratching, so they'll be smooth for a long time. I also decked out the chassis with an assortment of Trinity*, aluminum, purple screws and nuts. I strongly recommend that you use the stock *steel* screws in such vital areas as the transmission and



1. Associated's RC10T2 features a clean, logical design that has required very little maintenance. This truck has also proven to be quite durable throughout many months of racing. **2.** Up front: MIP Golden shock shafts were added to smooth damping. The kit's steel turnbuckle linkage has held up well, but several run-ins with big jumps have resulted in a pair of bent front hinge pins. **3.** Airtronics' smooth 94737 servo works well in the T2. The stock steering linkage and bellcranks show almost no signs of wear—even after dozens of race weekends! **4.** Altering the position of the little white spacer (shown to the rear of the T2's outer hub carrier) changes the truck's wheelbase and its handling. I've yet to find a track on which I prefer the longer wheelbase! **5.** In the rear: the kit's steel turnbuckles proved to be the weak link in the T2's rear suspension; one bent severely and caused major damage to an expensive drive shaft. The rear turnbuckles were replaced with Lunsford's titanium Punisher rods, and the drive shafts were replaced with MIP's CVD shafts.



The smoother the track, the lower you can go. Just remember not to lower the truck too much, i.e., below proper ride height. I've also found that just a little front toe-in (1 degree) really makes the T2 easier to drive. It allows you to get on the gas sooner coming out of turns and makes the handling slightly more forgiving.

rear-bulkhead mount; otherwise, the colored hardware really dresses up the T2.

• **Steering servo.** I elected to continue using the Airtronics* 94737 steering servo that I used during the "Thrash Test." Although not as fast or as powerful as servos such as the 94151 and 94152, the 737 provides very smooth response and "tempers" the T2's inherently aggressive steering. Since the Thrash Test, I installed a Tekin* 411-G2 ESC and have been impressed by its smooth "powerband" and its efficient use of battery power. The solder-type fuse that's built in to the side of the case works well, but it's a little

PARTS LIST

MIP

- 1082 CVD drive shafts for the RC10T2.
- Gold shock shafts (1.02-inch front; 1.32-inch rear).

TRINITY

- Purple screw set.

LUNSFORD

- Punisher titanium tie-rods.

PRO-LINE/PROTOFORM

- RAMbunctious ET Dodge racing truck body.

cumbersome to bridge the posts with solder without charring the case a bit. My tried-and-true Novak* NER-3FM receiver has provided glitch-free operation throughout the T2's career.

• **Body.** At the '95 Chicago Model Hobby Show, Pro-Line* exhibited a new version of its RAMbunctious ET body, which fits both the RC10T and the T2. Mine is painted to replicate the scheme that factory driver and world champion Mark Pavidis uses, and it gets a fair amount of stares at the track—until the people catch on that I'm not Mark (obvious once I start driving!).

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RC10T2

PERFORMANCE

I've raced with this T2 for so long and at so many different tracks that the best I can do is generalize about its performance.

Consistently, the T2 steers well, regardless of track surface and the type of tires used. So far, I've always used the set of Pro-Line Edge front tires that came with the kit. I tried a new set, but they gave almost too much steering, so I usually stick with the older, well-worn tires.

The "standard" kit setup, i.e., up front, no. 3 pistons and 25WT oil; in the rear, no. 2 pistons and 25WT oil—Green springs all around, works well on all but the bumpiest tracks.

For really rough tracks, up front, I use no. 2 pistons with 30WT oil; in the rear, I use no. 1 pistons, again with 30WT. Up front, I change to silver springs. I haven't yet found a track on which I prefer the long-wheelbase setup, so I always run in the short-wheelbase configuration. I've seen people try some pretty weird setups with their T2s, but I never deviate too far from these two basic setups.

Lately, I've been racing on a smoother, blue-groove-type track, and I've been experimenting by limiting shock travel. One 0.031-inch-thick spacer in each rear shock and two in each front shock have markedly improved the T2's responsiveness. The smoother the track, the lower you can go. Just remember not to lower the truck too much, i.e., below proper ride height. I've also found that just a little front toe-in (1 degree) really makes the T2 easier to drive. It allows you to get on the gas sooner coming out of turns and makes the handling slightly more forgiving.

Regardless of the track type, the T2 continues to impress me with its blend of efficient suspension and aggressive steering. Parts durability has been as good as can be expected of an off-road truck; to date, I haven't actually broken anything except the bent tie-rod mentioned previously. I've been using nothing but a pair of Reedy* Sonic M, 13-turn double motors—alternating between races and skimming the comm on a Trinity comm lathe after every two races—and I've been using the same 18-tooth pinion and 85-tooth spur gear since I started to run the T2 back in June '95!

In the future, I'll outfit my T2 with a full set of titanium tie-rods and hinge pins, and I'd like to try Team Losi's* Hydra Drive traction-control system—just as soon as I get a break from the racing action!

*Addresses are listed alphabetically in the Index of Manufacturers on page 184. ■

by JACK JOHNSON

Select the Right Off-Road Tire

OFF-ROAD TIRES have changed greatly over the years—that's for sure. There was a time when you threw away tires that came with kits because they were inexpensive ones that didn't really work; but they kept the price of the kits low. Those days are over. The tires that come packaged in most competition-level kits today generally come with much better tires.

Because tire technology has advanced, tires are available in many different compounds and tread designs. Although this can make selecting the right tire for your off-road vehicle difficult, there are ways to streamline the task.

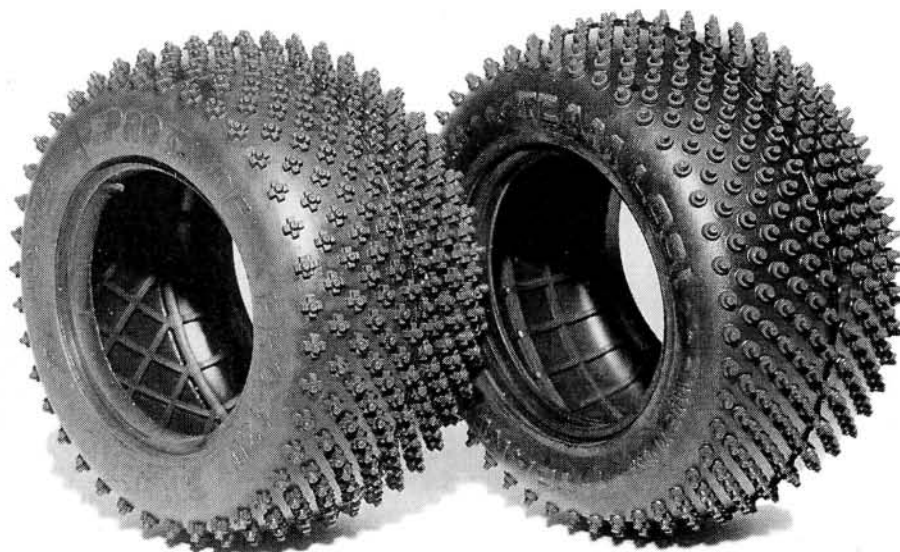
TIRES FOR THE TRACK

If you've just arrived at an unfamiliar track, look around the pits to see which tires the other racers are using. Chances are that most of them will be using similar types. Try those for a start. When you're familiar with the track's layout and

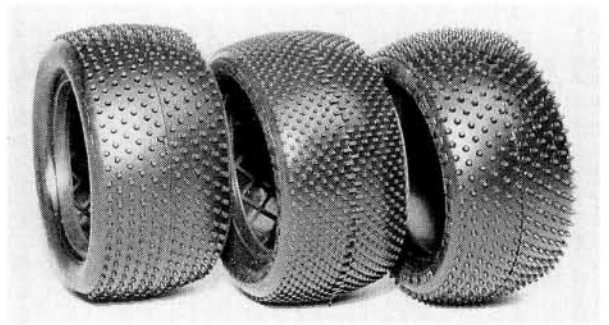
you're more comfortable with your vehicle, try other tires. It's amazing how much time you can waste if you look at a track and think to yourself, "These guys are crazy! What are they using those tires for?" There is usually a good reason why they aren't using the tire that *you* think would work better. If you plan to travel out of town to a race, call the track or a hobby shop there, and ask which tires most racers usually use. You can save money and luggage space by leaving at home the tires that you won't use at all, especially if you race trucks (their larger tires can take up a ton of room in a hurry). I focus my discussion on rear tires because they're more important to performance.

TREAD PATTERNS

Why are there so many different tread designs? It's because different tires work better in different conditions.



Tires with step-pin lugs are great for loose, loamy dirt. They don't load up with dirt as easily and they offer more traction than a standard-type lug.



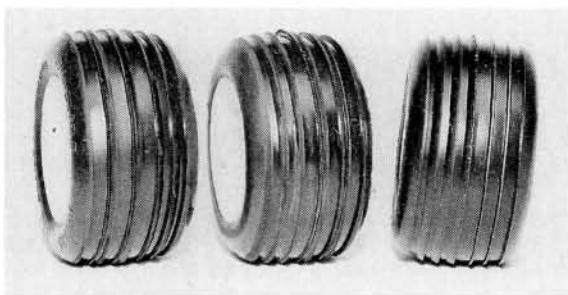
Fuzzie tires from Pro-Line and IFMAR pin tires from Team Losi are the most commonly used tires in racing. They offer superior traction on the slick, hard-packed surfaces found at major races.

- **For loose, fluffy dirt**—use a tire with a larger lug or bigger spikes.
- **For wet, loose, or heavy dirt**—here, a step-pin tire always works best. Not only are the lugs longer, but also, by having the two different diameters on the same lug, the bottom of the step-pin lug will "load up" with dirt, while the top of it will stay cleaner and will dig into the surface better. When the tires don't "load up" as much, they have much better and more consistent traction.
- **For dirt that is loose, fairly, deep, but not very wet**—start with a larger-diameter lug that isn't quite as long. Pro-Line* Stubbies and Team Losi* IFMAR Stud tires fit this description. Their treads have a large lug that will move loose dirt out of the way, but the lugs are much shorter than a step-pin lug. The shorter lug makes the tire feel much more solid (less "squirmy").
- **For dirt that is dry and not very deep**—try a mini-pin tread. These are usually similar to the Stubbies and Studs, but they have a thinner lug that allows more traction on a slightly harder, drier surface. Most manufacturers offer some sort of mini-pin tread design.
- **When a wet or dry surface is really hard-packed**—your best bet is almost always a Pro-Line Fuzzie or IFMAR pin tire. Pro-Line also offers a Square Fuzzie that seems to be working well in slick conditions as well as hard-packed ones. Fuzzie and IFMAR pin tires seem to be the most popular tires at the big events around the country. For consistent racing at big events, most tracks are kept hard and well-packed. There is no way to keep a track with loose dirt consistent for 25 to 40 heats of qualifying per round. Those tracks get so rough that you would find the middle of a dirt field smoother. Racers who are new to big events find the tracks a little slick, but once they've realized that

it's the same for everyone, I think they are happy with the consistency of the track. Fortunately, some of the new compounds were designed specifically for these slick tracks, and they offer great traction even on the slickest of surfaces.

FRONT TIRES

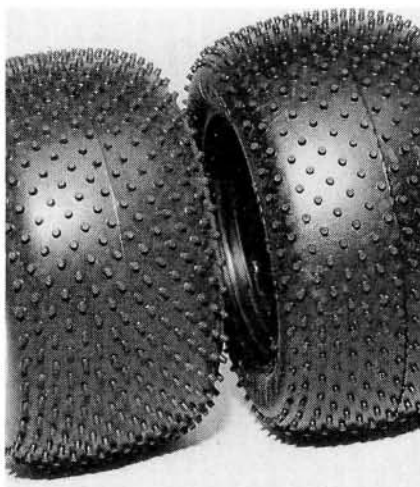
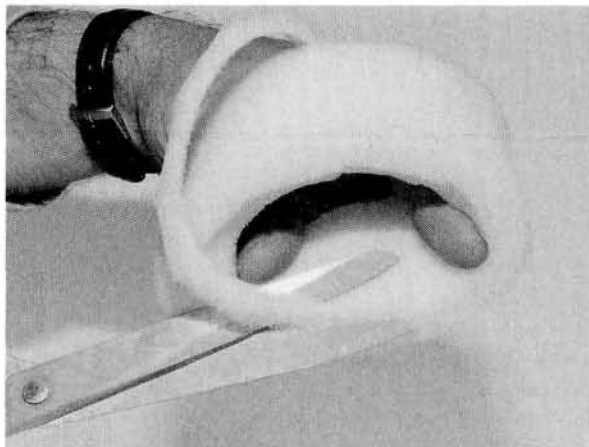
There isn't much to discuss about front tires. At every race I have been to in the last few years, all the top drivers have used a ribbed front tire on their cars and trucks. There are a few new tires that are becoming quite popular in the truck class, though—the Pro-Line Edge and Team Losi Directional tires. These are still ribbed tires—but each is a little different. The Pro-Line tires have angled ribs on one side and V-ribs on the other. The Team Losi tires have angled ribs on one side and thinner, straight ribs on the other. These tires can be mounted in either of two directions.



New types of tire designs for trucks are the Edge from Pro-Line and the Directional from Team Losi. These tires, which have different types of ribs on each side of the tire, seem to offer more steering than other tires. Because the ribs on each side of the tire are different, they can be mounted in two ways, with a particular rib facing inside or outside to adjust the steering response of your truck.

Generally, with the straight ribs or V-ribs to the outside, the tires will have more low-speed steering and, initially, they will turn-in harder. With the straight ribs or V-ribs to the inside, the tires react smoothly, but they have less low-speed steering. From what I have seen, there is no right or wrong way to mount them. Different drivers like them mounted in different directions.

The foam inserts for the softer-compound tires should be trimmed on the inside edge, as shown. This will make room for the mounting bead on the tire and the ribs on the wheel. Trimming the foam will make the sidewall of the tire slightly softer and will increase traction.



Mini-pin treads were the first to be used on slick surfaces. Now, Pro-Line Fuzzies or IFMAR pin tires have replaced them as the tires of choice for slick tracks. Mini-pins are still great for hard-packed surfaces that have a light layer of dust.

A COMPOUND PROBLEM

Now that you have an idea of which types of tires to use on different track conditions, which compound should you use? The general rule is:

- **Hard, slick track**—soft compound. A softer compound tire is also much better in bumpy sections, so even if the track is soft with high bite, if it has a really bumpy section, try a softer tire.
- **Soft, high-traction track**—harder compound. Although this rule doesn't work 100 percent of the time, it will work more often than not.

The general rule applies to both the front and rear tires, but you can also use the compound of the front tire to adjust how smoothly the car or truck reacts. For example, if the track has high traction and you are using a harder compound,

Soft in the Tread



Some manufacturers, such as Trinity and Team Associated, now offer chemical traction compounds (tire additives) that soften rubber. They not only increase traction, but also decrease tire wear.

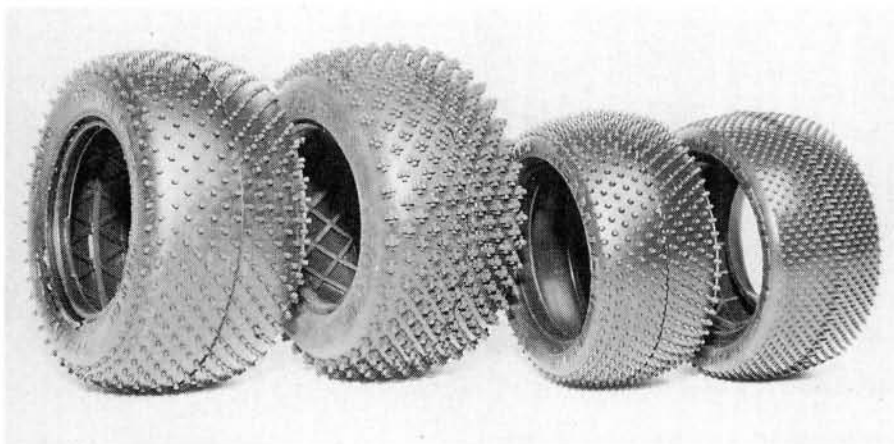
The latest trend in off-road racing is the use of chemical tire additives, or softeners. Although tire-traction compounds have been used on on-road racing tires for as long as I can remember, the use of softeners on off-road tires didn't begin until late 1994. For most of the '95 racing season, many factory teams "secretly" used chemicals on their tires. Now, a couple of manufacturers are selling such products. They seem to improve traction and lengthen the life of the tires.

Tire additives pre-date the soft compounds of today's tires. The story goes that a factory racer and manager found that soaking tires in thinners such as turpentine would soften the rubber. Once other teams found out about this process, hardware stores near off-road tracks all around the country started selling out of turpentine. Soon, the factory teams and racers developed better tire additives. The additives that are now commercially available yield results that are far superior to turpentine. These new products, which come in spray bottles, simply need to be applied to the tires about 10 minutes before a race. Not only do these additives soften the tires, but they also seem to make the rubber stickier. The result is more traction!

Caution! These products contain petroleum distillates. That means you should:

- Minimize your exposure to these products.
- Try not to inhale the chemical vapors.
- Avoid getting these solutions on your skin, and if you do, wash immediately.
- Always use tire additives in a well-ventilated area.
- Because tire additives are highly flammable, never use them near an open flame.
- Most important, read all the warnings printed on these products' manufacturer labels.

SELECT THE RIGHT OFF-ROAD TIRE



Glossary

- **Load up.** When a tire completely fills with dirt around the lugs or spikes. This usually happens on a wet track with loose dirt.
- **Squirm.** When the lugs on a tire flex and make the car feel as though it has a wiggle while accelerating.
- **Lug.** The pins or knobbies on a tire.
- **Mounting bead.** The area of the tire that is mounted on the wheel. It's usually a large rib-like area that sits between the ribs in the wheel.
- **Carcass.** The main body of the tire.
- **Sidewall.** The side of the tire that extends from the wheel to the outside of the carcass.
- **Compound.** The type of rubber that a tire is made of. A softer compound will usually have more traction than a harder one.
- **CA (Cyanoacrylate).** A glue. It's used to bond a tire's bead to the wheel and is available in different speeds (slow-curing and fast-curing). Has been known to glue fingers together instantly, so be careful!
- **Foam insert.** A foam ring or "donut" that is used in soft-compound tires to support the tire.
- **Kicker.** A spray used to "set" and speed up the drying of CA. Simply spray some kicker on the tire-bead/rim area once the glue has been applied, and it will instantly harden and "cure" the glue. It has been known to make the bond between the tire and wheel brittle.

Because of the wide range of tread designs available, you can find a tire for any surface.

the steering may be good, but it may feel particularly sensitive entering the corners. If this is the case, try a softer front tire. This will slow down the steering reaction time because the sidewalls will flex a little more before the tires dig in and make the vehicle turn. Most of the time, you won't lose much (if any) overall steering, but the slower reaction may make it harder for some drivers to go as fast. As with most other things in racing, try it yourself to see the results.

FOAM INSERTS

The new, softer compounds that are available today are so soft that a foam insert must be used to support the tire. The way you trim these inserts can affect the way they perform. To help the insert stay clear of where the tire is mounted to the wheel, trim off the inside corners of the foam. If this edge isn't trimmed, the inserts will be compressed, resulting in a

stiffer sidewall. The foam will also get pinched between the tire and the wheel more easily.

Factory racers vary the amount of foam insert used in a front tire to adjust the overall steering; it's sort of like adjusting the air pressure in a full-size tire. I know it may sound crazy, but when factory drivers use Team Losi Gold compound front buggy tires, they mount them with no foam inserts at all because they think that the tires will have more steering without them.

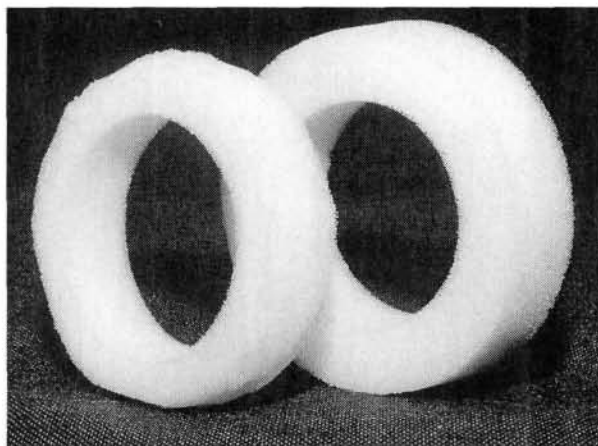
These drivers will cut the foam inserts smaller for use in Team Losi Silver- or Pro-Line M2-compound tires on the front of a buggy. Generally, the thinner the foam in the tire, the more steering it has. Of course, when mounting a truck *front* tire, you should always use the full foam insert. Truck tires are just too big *not* to use them.

THAT'S A WRAP

Now that you have a general idea of the type of tires and compounds to use, it should be a little easier to make a selection. The most effective way to test your choice is to run one tire for a few laps to get a feel for it. Then, during the same battery charge, try another type. This will ensure that one tire doesn't feel better because the track changed a little. If you try the tires "back to back," you'll know that the track conditions are exactly the same for both tires.

If you have helpers, let them record a few lap times. A tire that feels better may actually give lower lap times. During practice, it's a good idea to try different tires for a variety of track conditions. It will give you useful information if the track doesn't get watered and is dry,

or if the track gets watered heavily just before your heat. Some tracks can change drastically when watered. Knowing which tire to use for every track condition can be a big plus and may even mean the difference between making the A-Main or not making it.



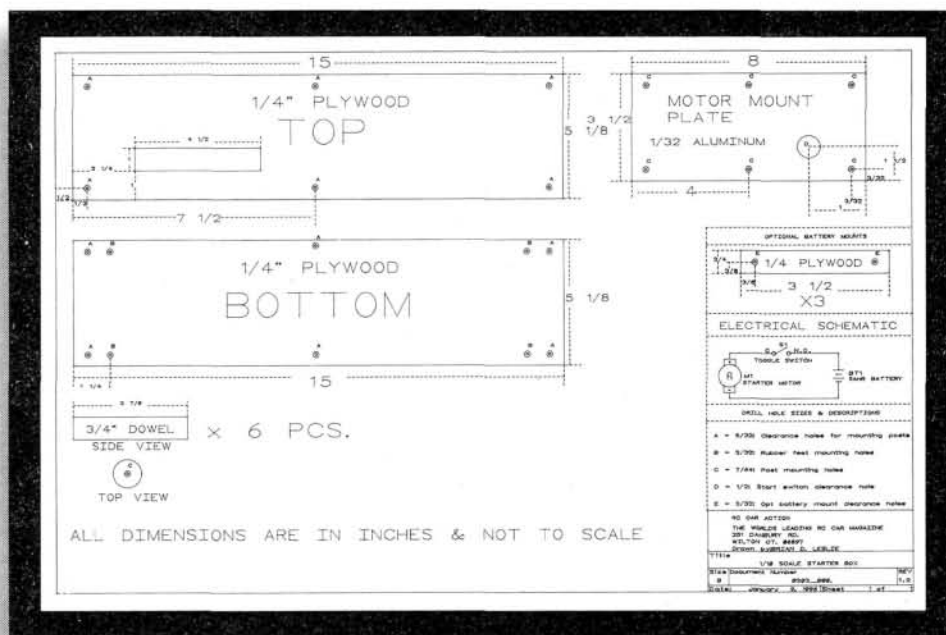
The foam inserts for buggy front tires can be trimmed smaller. This will usually increase the steering. Trimming a front foam (like the one shown on the left) is a little like running with less air pressure.

**Addresses are listed alphabetically in the Index of Manufacturers on page 184. ■*

HOW TO

Build Your Own Starter Box

by Brian Leslie

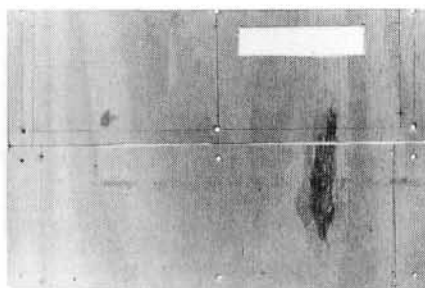


THERE ARE basically four ways to start a 1/10-scale nitro-powered engine.

- Use a pull-starter—like starting a lawn mower.
- Use a hand-held electric starter motor to bump a rubber starter wheel up against the motor fly-wheel.
- Install a KO-Propo* onboard starting system.
- Use a starter box—the most popular method. It's fast, easy and self-contained.

wheel can cost as much as \$100. You don't have the cash? You're not alone. But by following the steps shown here, you can build your own starter box for 1/10-scale nitro-powered cars and trucks while saving yourself a few dollars.

- 1. Top and bottom of box**
Cut the plywood into two equal 5 1/4x15-inch pieces. Use a sanding block to round the corners and smooth the rough edges.

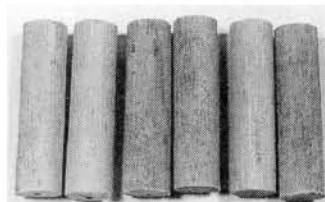


BUILD A BOX

A starter box contains a starter motor, a battery to power it and a rubber starter wheel. You set the car on top of the box, line up the fly-wheel with the rubber starter wheel, flip the switch to power the starter motor, apply a little downward pressure on the chassis and voilà! the little nitro burner comes to life.

Sounds nice doesn't it? But a starter box with motor and rubber

- 2. Mounting posts**
Cut the 3/4-inch-diameter dowel into six, 2 7/8-inch pieces. If you have a miter box, use it, because the pieces must all be the same length and cut square. Again, use the sanding block to round the sharp edges.



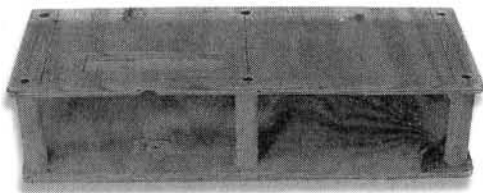
PHOTOS BY BRIAN LESLIE

- 3. Mounting-post clearance holes**
Clamp the two pieces of plywood together. On each of its four corners, mark a spot that's 1/2 inch in from each side. Then mark a spot 1/2 inch in and 7 1/2 inches down from either end (both sides). You'll drill at these spots for the dowel posts. Using a 5/32-inch drill bit, drill all the way through both boards.

- 4. Mounting-post holes**
Drill a hole in the center of each post. Using a 7/64-inch drill bit, drill a 1/2-inch-deep central hole in both ends of each post.

- 5. Assembly**
Using the drywall screws, attach the six dowels to one of the plywood pieces. Using the remaining screws, attach the other piece of plywood to the other ends of the dowels. If the holes don't quite line up, you may have to enlarge the holes in the plywood to cope with the misalignment.



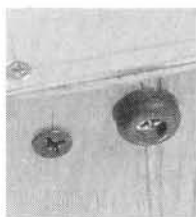


6. Cut a starter-wheel slot

To cut the slot for the rubber starter wheel, place the box lengthwise in front of you. Mark a spot that's $2\frac{1}{4}$ inches in from the left edge and 1 inch in from the edge nearest you. This mark will be the left front corner of the slot. Starting from the left, draw a $4\frac{1}{2} \times 1$ -inch rectangle that's parallel with the long edge of the plywood. In each corner, drill a $\frac{3}{8}$ -inch hole, then use a jigsaw to cut from hole to hole until you have a rectangular slot. Sand the rough edges.

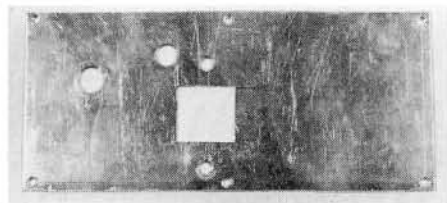
7. Add rubber feet

Mark four spots, each $1\frac{1}{4}$ inches from each end of the bottom of the box and $\frac{1}{2}$ inch in from each side. Drill four holes using a $\frac{3}{32}$ -inch drill bit and mount the four rubber feet using the four no. 6 wood screws.



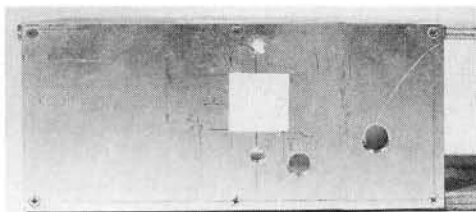
8. Starter-motor mounting plate

I didn't have a suitable piece of aluminum in my workshop, so I called a couple of local tool-and-die shops to see whether they had any scrap—no problem! They even cut it to size for me—no charge. In each of the four corners, mark a point that's $\frac{3}{32}$ inch in from both sides, then drill at these marks using a $\frac{7}{64}$ -inch drill bit. I countersunk the holes so that the heads of the wood screws that are used to mount the plate on the box sit flush with the plate.



9. Mount the motor plate

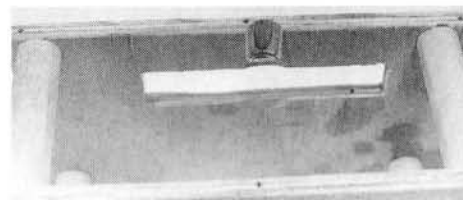
Install the motor plate on the sides of the plywood pieces near the cutout you made for the rubber wheel. The plate should line up with the left edge of the box and end $\frac{1}{2}$ inch past the center of the box. Using a $\frac{5}{64}$ -inch bit, drill through the six mounting-plate holes $\frac{3}{8}$ inch into the



top and bottom plywood pieces. Then mount the plate using the no. 4 wood screws.

10. Mount the starter motor and start switch

• Starter motor. Draw a vertical centerline $4\frac{1}{2}$ inches in from the plate's left edge. Most starter motors have some type of plastic stand or legs, so you'll have to set the motor on the floor with the starter box and line up the motor shaft with the centerline you've already drawn on the plate. Mark the spot, and drill a clearance hole for the shaft.



Motors differ, so you'll have to figure out where the mounting holes for your particular motor should be.

My top motor-mount nut didn't clear the top of the box, so I used my Dremel tool to carve out some clearance.

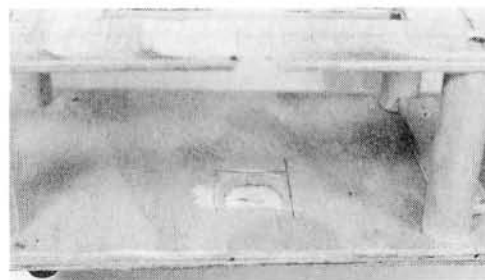
The size of the rubber feet you use will dictate how high the starter motor is mounted in the box. (You might have to allow

clearance for the starter wheel.) I used a Dremel tool to carve out the bottom piece of plywood to make room for the wheel.

Drill a clearance hole for the motor leads to pass through to the start switch

and battery. You may also have to drill a clearance hole through the motor leg for the bottom, motor-mounting-plate screw.

• Start switch. There are basically two ways to install this: mount a push-button switch on the box's top plate, under the car's chassis. When you press down on the



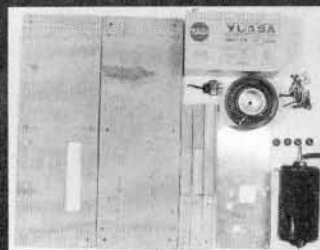
YOU'LL NEED

- Toggle switch
- Starter motor
- Rubber starter wheel
- 15Ah battery
- Can of spray dope
- 4, $\frac{1}{4}$ -in. long rubber feet
- 2, $5\frac{1}{4} \times 15$ -in. pieces of $\frac{1}{4}$ -in.-thick plywood

- 18-in. length of $\frac{3}{4}$ -in.-diameter dowel
- $8 \times 3\frac{1}{2}$ -in. piece of $\frac{1}{32}$ -in.-thick aluminum plate
- 12, $\frac{1}{2}$ -in.-long drywall screws
- 6 no. 4 wood screws ($\frac{1}{2}$ in.)
- 4 no. 6 wood screws ($\frac{1}{2}$ in.)

OPTIONAL BATTERY BRACKETS

- 3 pieces of $3\frac{1}{2} \times 3\frac{1}{2}$ -in. $\frac{1}{4}$ -in.-thick plywood
- 6 no. 6 wood screws ($\frac{3}{4}$ in.)



Here are the materials you'll need to build a starter box—plus a few tools and a little determination!

BUILD YOUR OWN STARTER BOX

car to bump the flywheel against the rubber starter wheel, the chassis presses down on the switch to start the starter motor. This is the most popular way.

Or you can use a toggle switch—mounted anywhere. Put the car on the box, flip the switch to turn the starter motor and bump the flywheel; when the engine starts, flip the switch to turn the starter motor off. I prefer this method. I installed a toggle switch 1 inch to the right of the starter motor and 1½ inches from the bottom of the plate.

11.

Paint time

Remove the starter motor, rubber feet and the toggle switch. If you have installed a push-button switch, remove this, too. To protect the wood from spilt fuel and exhaust residue, seal it with dope. Pactra* makes a spray-on dope that comes in several colors—ideal for this job. I chose a semi-gloss orange/red. Before you spray on the Pactra dope, apply a good wood primer.

12.

Start switch and wiring

Mount the starter motor on the plate, and mount the toggle switch. Mount the rubber starter wheel on the starter-motor shaft. Mount the assembly on the bottom section of the box. The positive lead from the starter motor should go to the common side of the switch. The normally open ("on") side of the switch goes to the positive side of the battery. The negative lead from the starter motor goes straight to the negative side of the battery. Use at least 14AWG wire; some starter motors draw a lot of juice. Cover the battery terminals with heat-shrink tubing or fuel tubing. I used fuel tubing because it is easy to pull back when I want to expose the terminals for charging. Having completed the wiring, re-mount the top of the box on the dowel posts.

13.

Chassis alignment

If you have only one car or truck, or you always use the same one with your starter box, you can hammer some nails into the top of the starter box (or use dry-wall screws) to help line up the flywheel and the starter wheel. Place the vehicle (without the body) on the box and line up the flywheel and starter wheel. Drive the nails (or screws) into the wood in front of the front suspension arms and along the chassis sides. Cover them with fuel tubing to protect the chassis from being scratched. Three or four strategically placed nails/screws should do the trick.

14.

Install the battery

Almost any 12V battery that's rated for at least 5Ah can be used to power your new starter box. I use a 7Ah dry cell that I picked up at a used electronics shop for \$4. If you buy a battery that will fit inside the box, the box will be more compact, portable and convenient to use. I made small plywood brackets to hold the battery in place, but double-sided tape or Velcro®-brand fastener work just as well.

To use battery brackets or holders, position the battery in the starter box and put the three plywood pieces around the battery to wedge it in. Attach the pieces using the six no. 6 wood screws.

To make your box really solid,

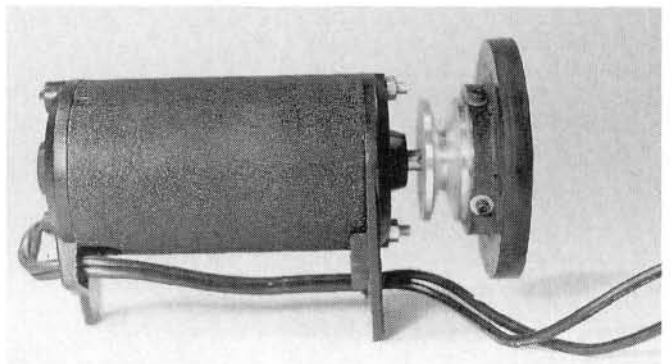


apply Elmer's wood glue or any carpenter's glue to each of the screws

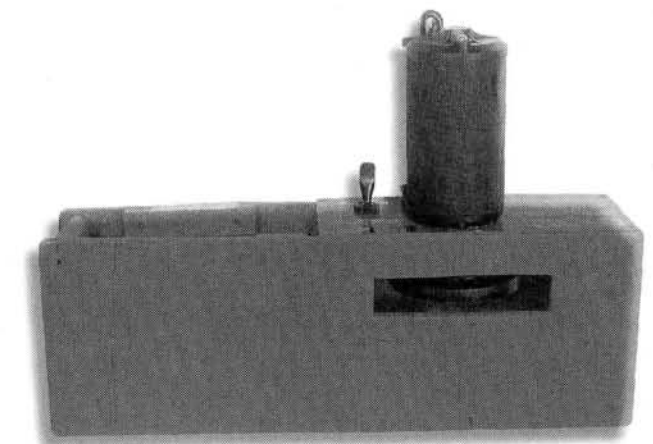
before installing them. I chose to assemble the box completely to make sure everything fit properly; then I took it apart and assembled it with glue. Do not put glue on the top plate or the motor-mounting plate until you're ready for final assembly (see step 12).



FINISHING UP



Most hand-held starter motors will work fine. Just make sure you pick up a large rubber starting wheel.



Here's what your finished starter box should look like. Not only will it work well, but you saved approximately \$75 by building it yourself.

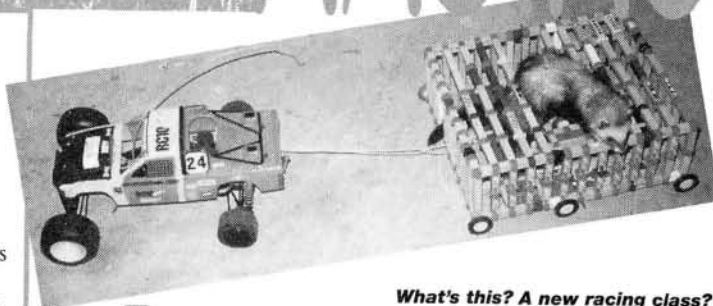
Congratulations! You've just saved about \$75—that's about 3 gallons of fuel or two sets of pistons and sleeves. However you look at it, it's money in your pocket.

* Addresses are listed alphabetically in the Index of Manufacturers on page 184. ■

From the track to the parking lot.
This is the R/C action as **you** see it.

Grassroots

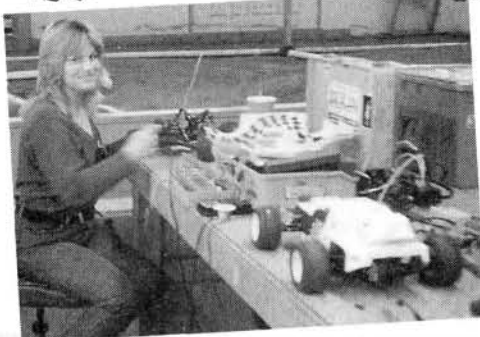
This is YOUR PAGE—YOURS!! It belongs to you, the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—whether on-road or off-road. We at *Car Action* really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035.



Ferretting Out a Ride?

What's this? A new racing class? Ferret-pulling? Well, as you can see, Paul Averill's RC10GT is ready for action. We really just hope his passenger is as willing to participate.

Girls Don't Just Wanna Have Fun...



They also wanna kick butt at the track

Vicki Richardson, aka Miz Vicky, has been racing dirt oval, pavement and, more recently, off-road, for three years. Racing her Associated RC10T2, she TQ'ed at the Arizona State Championships and took fourth place at the California State Championships. She most recently ran in both Stock Buggy and Modified Truck at the Long Beach Convention Center's Exhibition race.

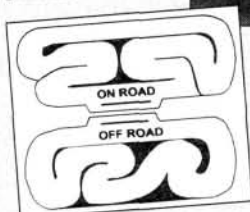


In case you're in the neighborhood, here's a map to show you the way.

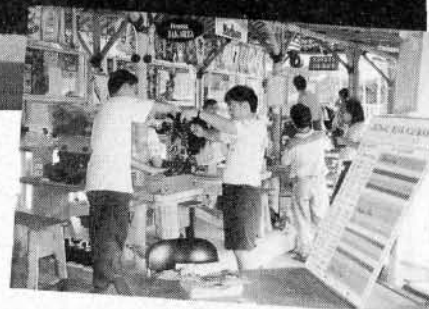


The INDO 500?

Here's a view of a popular racing club in Jakarta, Indonesia—the Pondok Cabe Circuit. From what we can tell by the photos, maps and brief letter we received, the club features both an on-road track and an off-road track. They hold weekly races and offer a repair service as well as a full-service hobby shop. The club is highly organized and employs a large management team. If you want more information, contact Pondok Cabe Circuit, Jl. Kunir No. 83 Pondok Cabe, Ciputat, P.O. Box 18/CPAPC/15418; phone 62-21-7403568 or 62-21 7403569; fax 62-21 7491533.



Above: the awesome on-road track. Left: their crazy off-road track is placed back-to-back with the on-road one. Right: the club also offers a covered pit area, which the racers happily take advantage of.



call now!

Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series
(404) 963-0252

Tamiya R/C Championship Series
(800) TAMIYA-A

Kyosho R/C Sport Racing
(800) 682-8948 ext. 085F

Hobby Shack Parking Lot
(714) 964-8846

Hobby Town USA Parking Lot
(402) 434-5050

Trinity's Street Spec Series
(908) 862-1705

Tamiya Trio

Here are the entrants (right) and the winners (below right) in the Tamiya R/C Championship Series Race 20, which was hosted by Sheldon's Hobbies in San Jose, CA.



F1 1. William Brown 2. Richard McClosky 3. Dave Warren	FWD SEDAN 1. Mike Stone 2. Chris Rogers 3. Craig Schall	4WD SEDAN 1. Mark Rebeck 2. Randy West 3. Craig Schall
TOP ROOKIE F1 Daniel Ford	BEST OF SHOW FWD Chris Rogers	BEST OF SHOW 4WD Craig Schall
BEST OF SHOW F1 Randy West	TOP QUALIFIER FWD Mike Stone	TQ 4WD Randy West
TQ F1 Richard McClosky	TOP ROOKIE 4WD Rafael Renteria	



The winners (left) and entrants (below) of Race 21, hosted by Tamiya America at their home track in Aliso Viejo, CA, smile for the camera.



F1 1. Bruce Hickman 2. Brandon McNally 3. Steve Williams	4WD SEDAN 1. Dave Berger 2. Don Impens 3. Bob Sager	GTP&GTO 1. Mark Rebeck 2. Duan Dao 3. Steve Baker
FWD SEDAN 1. Joe Houda 2. Roy Alaam 3. Steve Nguyen	4X4 TRUCK 1. Joshua Mitchell 2. Tim Leath 3. Mike Smith	
TOP F1 ROOKIE Brandon McNally	BEST OF SHOW FWD Stan Hortinella	BEST OF SHOW TRUCK Tim Leath
BEST OF SHOW F1 Tom Watana	TQ FWD Joe Houda	TQ TRUCK Joshua Mitchell
TQ F1 Brandon McNally	TOP 4WD ROOKIE Fernando Salas	BEST OF SHOW GTP Duan Dao
TOP FWD ROOKIE Brent Clan	BEST OF SHOW 4WD Mickey Cohen	TQ GTP Mark Rebeck
	TQ 4WD Dave Berger	

...And, last but not least, the entrants (right) and the winners (below right) of Race 22, which was hosted by National Hobby Supply in Middletown, NY.

BEST OF SHOW F1 Angus Lee	BEST OF SHOW 4WD Alan Mok
TQ F1 Jack Matthew	TQ 4WD Willie Wong
BEST OF SHOW FWD Angus Lee	BEST OF SHOW TRUCK Noe Osorio
TQ FWD Willie Wong	TQ TRUCK John Palishon
TOP 4WD ROOKIE Brendon Bolling	





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(310) 214-0244

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(408) 945-6524

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8950 OSAGE AVE.
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Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311
           

Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441
           

Mitey Motor Speedway, 1109 N. Bloomington St., Rte. 23, Streator, IL 61364; Doug, (815) 672-4212
        

PRO LINE TRACK DIRECTORY

Southside Speedway, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233

Trackside Racing, 445 8th Ave. NW, New Brighton, MN 55112; Winton Otelie, (612) 633-2112

Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248

MISSISSIPPI

Fast Freddy's Raceway, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315

Joe McFadden Hobbies, 1619 51st Ave., Meridian, MS 39307; Joe McFadden, (601) 483-7000

Rural Hill Raceway, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429

Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST

MISSOURI

All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767

B&L Hobbies & Raceway, 2800 Anchor Dr., Park Hills, MO 63061; Bob Marler, (314) 431-9444

Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238

Columbia R/C Trax, 1502 W. Bus Loop 70 (Exit 125), Columbia, MO 65202; Gary Phillips, (314) 682-3993

GreenTree R/C Racepark, St. Louis Dirt Burners R/C Club, Marshall Rd., Kirkwood, MO; (314) 831-2194

Lafayette Riverside Raceway, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Laningham, (314) 966-8912

Mid-Mo R/C Raceway, 400 W. 2nd., Sedalia, MO 65301; (816) 826-5113

Ozarks R/C Raceway, Hwy 13, Brighton, MO 65781; Gene Rhodes or Ron Hawkins, (417) 742-4376 or (417) 742-2561

Suppenbach Winter Racing, Route 5, Box 66, Pleasant Hill, MO 64080; Larry Suppenbach, (816) 987-5828

MONTANA

Stormer Raceway & Slot Motorplex, P.O. Box 126 Hwy 2 East, Glasgow, MT 59230; (406) 228-4569

NEBRASKA

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865

Wild Card Raceway, RR1 Box 137, Columbus, NE 68601; Roger F. Miller, (402) 564-7743

NEVADA

Dansey's Indoor R/C & Hobbies, 741 N. Nellis, Las Vegas, NV; David Lugo, (702) 453-RACE

NEW HAMPSHIRE

Silverbowl Speedway, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577

Western R/C Raceway, 6404 Richmar, Las Vegas, NV 89139; Randy Grigg, (702) 897-7227

NEW JERSEY

Fasttracker Club, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 357-8393

Hobby Etc., Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549

Open Season Sports Center, Rt. 302, Lisbon Rd., Lisbon, NH 03585; Joseph Wiggitt, (603) 838-6602

Outback Raceway, East Washington Rd., P.O. Box 508, Bradford, NH 03221; Jim or Bill Thompson, (603) 938-2425

NEW MEXICO

Bob's American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Bob Morrisco, (908) 446-3737

Family Hobbies Raceway, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790

Golden Hobbies Raceway, 415 Erial Rd., Pine Hill, NJ 08021; John or Iona Golden, (609) 782-1222

Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525

LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122

Millville R/C Oval, 114 N. High St., Millville, NJ 08332; William Denstoz, (609) 327-4640

Pit Stop Dragway, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)

The Race Place, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215

On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422

Zeppelin Hobbies, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717

MEERSCHIEDT R/C RACEWAY PARK, Walnut and Hadley, Meerscheidt Park, Las Cruces, NM 88001; Wayne Ward, 2230 Coleen Ct., (505) 523-4863, (505) 526-1758

BarnStormers, MD #1 Old Oxford Rd., Chester, NY 10918; Lou, (914) 469-8206

Beach Hill Speedway, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616

Brian's Off-Road Track, 1124 N. Forest, Williamsville, NY 14221; Brian Was, (716) 633-8155

Brookport Speedway, 6000 Sweden Walker Rd., Brookport, NY 14420; Gil & Betty Glidden, (716) 637-6224

Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194

C&D Raceway, 12542 NYS Rte. 12E, Chaumont, NY 13622; Chris or Don Bourquin, (315) 649-5403

Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-7859

Central New York R/C Auto Racers, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140

Chipmunk Hill R/C Speedway, 217 Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065

Hal's Hobby Shop, 120 Cayuga St., Fulton, NY 13069; Hal & April Halstead, (315) 598-2772

Jerry's Raceway, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940

Li 1/4-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384

Long Island Raceway, 168 Broad Hollow, Farmingdale, NY 11735; Jane, (516) 845-7223

The Model Shop, 1 Lakewood Ave., Monticello, NY 12071; Richard Cimino, (914) 791-6075

Mountain Raceway, Budd Rd., Phillipsport, NY; Joe Colombo, (914) 647-1121

National Hobby Supply, 25½ Webb Rd., Middletown, NY 10940; Bruce Roosa, (914) 342-6786

N.Y. R/C Raceway, 300 W. 55th St., New York, NY 10019; Jack Zelner, (212) 956-7296

Performance Plus Radio Control Speedway/The Hobby House, 1141 ½ Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772

P.R.O. Speedway, 5 Washington St., Cattsburg, NY 14719; Marc Pritchard, (716) 257-3101

R/C Hobbies, Rt. 49, Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536

R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14502; (716) 425-3722

Rampage R/C, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456

Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600

Small Torque Racers of Long Island, 13 Melony Ave., Plainview, NY 11803; Thomas Bolger, (516) 938-9005

South Shore Hobby & Raceway, W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567

Speedworld R/C & Hobby, P.O. Box 482, Chenango Bridge, NY 13745; Michael Magnusson, (607) 648-2063

Tri County Remote Control Car Club, 33 West Decker St., Johnstown, NY 12095; Jim Sprouse, (518) 762-8884

Ulster County Speedway, P.O. Box 71, New Paltz, NY 12561; Joe Colombo Jr., (914) 754-7664

Wall's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291

Westfield R.C. Speedway, 27 Clark St., Westfield, NY 14787; John or Jared Lindstrom, (716) 326-2339

Whitestone, 30-56 Whitestone Exp., (Dept. of Motor Vehicles), Flushing, NY 11374; Rudolf Ardilla, (718) 966-6155

ZOAR Road Speedway, 15318 Armes Ct., Gowanda, NY 14070; David & Gordon Ackler, (716) 532-9463

THE ANTIQUE BARN, 2810 Forest Hills Rd., Wilson, NC 27893; Steve Seidinger, (919) 237-6778

Badin Shore Raceway, 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, (910) 431-6407

C/C Hobby Speedway, 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27317; Steve & Mary Cox, (910) 495-3482

C&H Raceway, 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321

Cape Fear Speedway, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (910) 452-2354

Carolina Dragway, 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-4569

Carolina Hobbies R/C Raceway, Route 1, Box 158, Taylorsville, NC 28681; Kim & Roseanne Kulawik, (704) 495-4040

Carolina Motorsports, 1517 Broadwood Dr., High Point, NC 27360; (910) 885-3713

Clapp's R/C Motor Speedway, Rt. 4, Box 300A, Siler City, NC 27344; Al Clapp, (919) 663-3198

Clinton R/C Raceway, 907-C Warsaw Rd., Clinton, NC 28328; Corbett Marshburn, (919) 592-9489

Hobby Club R/C Raceway, 1241 Buck Jones Rd., Raleigh, NC 27606; Hobby Club, (919) 460-8838

King R/C, P.O. Box 897, Five Forks Village, King, NC 27021; Chris Smith, (910) 983-3969

King Super Speedway, 143 Industrial Dr., P.O. Box 897, King, NC 27021; Chris Smith, (910) 983-5598 or (910) 883-3969

Mine Hole Gap R/C Raceway, 1297 Charlotte Hwy., Asheville, NC 28730; Steve Shultz, (704) 628-3020

Ride & Slide R/C Raceway, 5319 Yaddin Rd., Fayetteville, NC 28303; Jim Woodman, (910) 425-5276 or Bill Culbertson, (910) 867-4202

R.J.S. R/C Parkway, Rt. 9, Box 651, John B. Carter Rd., Fayetteville, NC 28301; Tony Starling, (910) 486-4820

S&B Speedway & Hobbies, Rt. 1, Box 311A, Farmville, NC 27828; Ricky Strickland, (919) 753-4422

Sandhills Raceway Inc., US #1 South, Aberdeen, NC 28315; (919) 944-7414

Hacienda Hills Speedway, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 839-4419

HOIO

Aerotech Raceway, 409 Applegrove Rd., North Canton, OH 44720; (216) 499-1300

Classic Hobbies, 1994 E. Waterloo Rd., Fargo, ND 44312; Walt Ellis, (216) 733-6400

C/R Hobbies and Raceway, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833

CORCAR/Sams Club, 128 Amity Rd., Galloway, OH 43119-8732; Bill Stevenson, (614) 870-7159

D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (216) 682-4266

D&S Hobbies Raceway, 7701 Crile Rd., Concord, OH 44077; (216) 354-2112

Flag City Raceway, 3772 C.R. 18, Findlay, OH 45840; Ruth Hubbard, (419) 422-5589

JB Hobby & Raceway, 8760 St. Rt. 201, Tipp City, OH 45371; Bob Curtis, (513) 845-8222

Kent Hobby, 832 N. Mantua St., Kent, OH 44240; Bob Sabo, (216) 673-0422

Lafferty R/C Raceway, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818

Medina R/C Raceway, 754 N. Court St., Medina, OH 44256; Bill Aholt, (216) 723-0255

Mid American Raceway, 13150 Airport Hwy., Swanton, OH 43558; Bill or Chuck, (419) 475-9459

Mr. T's R/C Super Speedway, 5540 CR 16, Wauson, OH 43567; Nick Tinsler, (419) 335-3196

Performance R/C Club of Ohio, 2206 13th St. NE, Canton, OH 44705; Greg Ledbetter, (216) 453-7089

Scotter's Hobby Hut, 234 Robbins Ave. #D, Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411

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Northern Mini Racers, P.O. Box 415, Minot, ND 58702; Roger Lee, (701) 839-5294

Surrey International Raceway, RR 1, Box 37, Norwich, ND 58768; Marlen Lenton, (701) 728-6760

Valley Hobbies Inc., 2714 Main Ave., Fargo, ND 58103; Marshall Skare, (800) 493-9971

OHIO

Aerotech Raceway, 409 Applegrove Rd., North Canton, OH 44720; (216) 499-1300

Classic Hobbies, 1994 E. Waterloo Rd., Fargo, ND 44312; Walt Ellis, (216) 733-6400

C/R Hobbies and Raceway, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833

CORCAR/Sams Club, 128 Amity Rd., Galloway, OH 43119-8732; Bill Stevenson, (614) 870-7159

D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (216) 682-4266

D&S Hobbies Raceway, 7701 Crile Rd., Concord, OH 44077; (216) 354-2112

Flag City Raceway, 3772 C.R. 18, Findlay, OH 45840; Ruth Hubbard, (419) 422-5589

JB Hobby & Raceway, 8760 St. Rt. 201, Tipp City, OH 45371; Bob Curtis, (513) 845-8222

Kent Hobby, 832 N. Mantua St., Kent, OH 44240; Bob Sabo, (216) 673-0422

Lafferty R/C Raceway, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818

Medina R/C Raceway, 754 N. Court St., Medina, OH 44256; Bill Aholt, (216) 723-0255

Mid American Raceway, 13150 Airport Hwy., Swanton, OH 43558; Bill or Chuck, (419) 475-9459

Mr. T's R/C Super Speedway, 5540 CR 16, Wauson, OH 43567; Nick Tinsler, (419) 335-3196

Performance R/C Club of Ohio, 2206 13th St. NE, Canton, OH 44705; Greg Ledbetter, (216) 453-7089

Scotter's Hobby Hut, 234 Robbins Ave. #D, Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411

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RACING TO BRING YOU THE BEST!

PROTOform®

The "Aero-Advantage"

The 1996 NASCAR series is off and running; and to the surprise of many, the Yates Team's Fords pretty well dominated at Daytona, winning the Clash, one of the 125s and the Daytona 500. With a little more tweaking, the great-looking new 1997 Pontiac will definitely be a contender. Look out Chevrolet!

We at Protoform are really excited because in the first few weeks of 1996, our three newest stock-car bodies have produced results almost identical to those of the "big cars." It started at the K&N's Winter Blast.

Protoform-bodied race cars dominated and won all three categories, with Steve Fiume and Frank Polimeda as the big winners in Modified. Stock category winners were Warren Strong Jr. and John Haunstein.

At the annual Snowbird Classic in Tampa, FL, Mike Boylan edged Sean Cochran for the modified title using the #1209 L '95 Monte Carlo. Using a 1996 Pontiac #1208L, Paul Schaub was the victor in Stock. Garry Warren used the same body when he rewrote the records at King R/C's ultra-competitive indoor facility.

A week before the Daytona 500, Frank Polimeda tried Protoform's new #1212 (high downforce) 1996 T-Bird for the first time at the Penn state Carpet Oval Championships. A huge field of over 250 entrants could only watch as Frank TQ'd his EV-10 and smoked the field in the A-Main. All but one car in the Main "wore" a Protoform body. More than a few racers were heard muttering, "Finally, a Ford body with downforce, and it still looks like a T-Bird should!" Protoform racer Kirby Hand handled the field in 1/12-scale. A week later, at Brockport Raceway's Anniversary Race, Mike Bevan was the first to eclipse the track record with Protoform's latest—the #1214 1997 Grand Prix—but when the smoked cleared, Brian Randazzo TQ'd and re-set the record on his way to victory with his concours-winning T-Bird #1212L.

The day before the Daytona 500, the Domingus Hills Velodrome hosted NORRCA's first speedfest of 1996. Once again, the Fords had everyone covered, and Protoform's #1210 1996 T-Bird HS (high speed) was clearly the body of choice. Bryan Blaser showed "blazing speed" when winning the Expert Stock title, while teammate Bill McAneney TQ'd with a record run in the Speedway (Enduro) class. Mark Frost won the Speedway Main with yet another #1210 T-Bird. However, it was in the Expert



#1214R—1997 Grand Prix SS

Modified A-Main that the Protoform T-Bird really proved it gave the "aero-advantage". Seven of the top 10 finishers used the #1210 body, with John Ligons just edging out John Peterson and Erik Steenhoven for a Protoform 1-2-3 finish!

Grand Rapids, MI, once again hosted the Winter Championships—the second race in the "triple Crown" for 1/12-scale on-road and 1/10-scale Formula 1 competition. In an A-Main that saw eight out of 10 using a Protoform F1 body, Josh Cyrul won the F1 category with our McLaren MP4/9. Brian Berry TQ'd and won the Stock A-Main with his P-35 Nissan, while Skip Starkey repeated his Cleveland win in the Masters competition. Skip's P-35 edged out TQ'd racer and teammate Steve Lafara. Mike Blackstock continued his domination of the Modified class with a convincing TQ and event win. Nine of the 10 in the Modified A-Main used the #1603L Nissan P-35 or the latest #1605 Courage C41 WSC body.

Many congratulations to all those racers who chose Protoform race bodies to be a part of their winning combinations! There's more good stuff to come in 1996.

New & Hot Protoform Body Styles!

- 1212 1996 T-Bird SS (high downforce); regular and lightweight.
- 1214 1997 Pontiac Grand Prix SS—killer new curves!; regular and lightweight.
- 1303 1996 Monte Carlo (wide version); regular and lightweight.
- 1605 Courage C41 WSC 1/12-scale; regular and lightweight.
- 1511 "The Bomber" buggy body for RC10B2 (with wing)—fits just right!
- 1406 1996 (DTM) Mercedes-Benz C-Class Int'l Touring Car Championship (with wing); fits Tamiya FWD/4WD, Yokomo YR-4 and HPI RS4 (narrow).

Racing to Bring You the Best!

RACING TO BRING YOU THE BEST!

Steel Valley Hobbies & Raceway, 157 N. 4th St., Steubenville, OH 43952; William Northrop, (614) 282-3003

ACCESSORIES

Van Wert R/C Raceway, 112 W. Main St. (above Tom's Donuts), Van Wert, OH 45891; Charlie Hire, (419) 238-4917

ACCESSORIES

City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025

ACCESSORIES

OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 24th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-1416

ACCESSORIES

Competition R/C, 180 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809

ACCESSORIES

Coweta Hobby & Speedway, 310 S. Highway, Coweta, OK 74429; Derald Seabolt, (918) 486-3948

ACCESSORIES

Off-Road Car Assoc. of Tulsa, 9720 Swan Dr., Broken Arrow, OK 74014; George Gooch, (918) 486-4528

ACCESSORIES

Remote Control Race Course, 400 S. Vermont Ave., Suite 104, Oklahoma City, OK 73108; Rick or Steve, (405) 347-RACE

ACCESSORIES

Wild Country Speedway, 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 7-1686

ACCESSORIES

OREGON

Competition Racing Assoc., 17941 NE Glisan, Portland, OR 97230; Mark Taylor, (503) 257-0796

ACCESSORIES

Junior Vehicle Speedways, 3090 Firwood Ct., Medford, OR 97501; (503) 779-3090

ACCESSORIES

Pit Stop Hobby, 634 N. Coast Hwy., Newport, OR 97365; Richard Wood, (503) 265-2825

ACCESSORIES

R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188

ACCESSORIES

R/C Speed Center, 2810 N. Pacific Hwy., Astoria, OR 97101; (503) 779-8298

ACCESSORIES

Smith County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234

ACCESSORIES

PENNSYLVANIA

D's Bumps & Jumps, RR7, Box 739SC, Stroudsburg, PA 18360; Dan Ambrosio, (717) 424-1750

ACCESSORIES

Bachman's Speedway & Hobbies, Box 306, Effort, PA 18330-0306; Jeffrey Bachman, (610) 681-5845

ACCESSORIES

Enders Junction Speedway, 2300 Enders Dr., Bath, PA 18014; Gerald Wambold Jr., (610) 759-0161

ACCESSORIES

Brookville Hobby Shop, 170 Main St., Brookville, PA 15825; Mark Tonell, (814) 849-7385

ACCESSORIES

CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635

ACCESSORIES

Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (814) 765-3045

ACCESSORIES

Personna Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506

ACCESSORIES

DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200

ACCESSORIES

Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052

ACCESSORIES

East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602

ACCESSORIES

Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765

ACCESSORIES

Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (610) 269-1300

ACCESSORIES

Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866

ACCESSORIES

Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223

ACCESSORIES

Lug Nut Raceway, Rt. 309 at Hartman Rd., Montgomeryville, PA 18936; Kathy Anderson, (215) 542-8250

ACCESSORIES

Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458

ACCESSORIES

The Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Joe, Bruce, or Drew, (610) 444-1850

ACCESSORIES

Owens Race-A-Rama, RR 2, Box 98 F. Hunlock Creek, PA 18621; Rany Owens, (717) 477-3220

ACCESSORIES

Pinion Twisters, 3M Plant, Green Ln. and Mitchell, Bristol, PA; John (215) 632-9744, Bob (215) 945-0325

ACCESSORIES

Pit Stop Hobbies, 262 W. Main St., Mount Joy, PA 17552; James Stoudt Jr., (717) 653-6222

ACCESSORIES

Pro Challenge Raceways, Wycombe Ave. (P.O. Box 536), Lansdowne, PA 19050; Bob Paulavage and Don Fewkes, (610) 622-7651

ACCESSORIES

Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288

ACCESSORIES

RCO Raceway 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490

ACCESSORIES

Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365; Jeff, (814) 723-4211

ACCESSORIES

Rolling Wheels R/C Raceway, Westhill Shopping Center, Coraopolis, PA 15108; Peg, (412) 262-4858

ACCESSORIES

Road Runner Raceway, 1027 E. 7th St., Bloomsburg, PA 17815; John, (717) 784-1260

ACCESSORIES

S.A. Hi Banks, Hahn's Dairy Rd., Palmerton, PA 18071; Scott Andrews, (610) 377-6123

ACCESSORIES

Sinking Spring Race Center, 237 South Hull St., Sinking Spring, PA 19080; Randy Gelsinger, (610) 670-0760

ACCESSORIES

Staub Bros. R/C Speedway, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445

ACCESSORIES

T-N-T Raceway, Randolph Rd., Great Bend, PA 18821; Ed Kraft, Rd. 1 Box 199C, Hallstead, PA 18821; (717) 967-2604 or Frenchie (607) 775-1756

ACCESSORIES

Wagonhill Hobbies, 967 New Castle Rd., Rt. 422, Butler, PA 16001; Jeff Hyatt, (412) 865-9877

ACCESSORIES

Willow Mill Speedway, 37 N. Season's Dr., Dillsburg, PA 17019; George Verbowitz, (717) 432-4445

ACCESSORIES

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Racing Around the World!

1995 Japanese Pro Nationals

Barry Baker TQ's and wins

1995 U.K. 1/12-scale National Championships

Craig Drescher TQ's and wins

1995 Cleveland 1/12-Scale Indoor Championships

Mike Blackstock TQ's and wins Modified 8 out of 10 cars used Pro-Line/Jaco tires

1995 NORRCA On-Road Nationals

Masami Hirosaka TQ's and wins 1/10 Modified

1995 ROAR Carpet Oval Nationals

Pro-Line/Jaco tires TQ and win every class
Ron Cutman wins 1/10-scale Modified
Frank Polimeda wins 1/12-scale Modified

1995 ROAR On-Road Nationals

Mike Lufaso wins 1/10-scale Modified
Joel Johnson wins 1/12-scale Modified

Congratulations and thanks to everyone who has chosen Pro-Line/Jaco tires to go racing!

Helpful Hint #4

Low-wear tires have the distinct advantages of long life and superb traction, but these characteristics can make life in the pits difficult. Sometimes, trying to true these tires can be a real problem. There are some tips that can help you to eliminate much of the hassle involved in tire truing.



Mounted and Trued F1 Foams

A good starting point is: never try to take too much material off with a cut. The tire june be deformed or the rubber june actually melt because of the heat. Take your time, and you'll be pleased with the results. If you think that you'll be truing a lot of these tires, it might be wise to invest in a carbide cutter attachment for your machine.

The rules you must follow when you cut the tire's outside diameter also hold true when you round the edges. For this task, a file works very well. Again, to minimize heat build-up, file only for a short time on each side.

Following these hints should decrease your problems and increase your enjoyment of the sport.

RACING TO BRING YOU THE BEST!

P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968

PUERTO RICO

Dorado Offroad R/C Track, Pista Atletica Bo. Higulliar, Dorado, Puerto Rico 00646; Roberto Lamoso/Jaime Ramos, (809) 796-5603 or (809) 796-1734

Hacienda Muñoz R/C Track, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083

RHODE ISLAND

SK Hobbies Inc., 15 Carl St., Johnston, RI 02919; Slim or Keith, (401) 453-1440

Tri-State R/C Raceway, 205 Hallene Rd., Warwick, RI 02886; Raymond Dean, (401) 738-4908

SOUTH CAROLINA

The Great Escape, 105 Franklin Ave., Spartanburg, SC 29301; Jonathan Bowen, (803) 574-5273

Hobbies and More, 1570 S. Main St., Darlington, SC 29532; Jerry Pollard, (803) 393-0355

J&M R/C Hobbies, 5341 Dorchester Rd., Evanston Plaza, N. Charleston, SC 29418; Mike Smith, (803) 552-9449

ORA Atomic Racing Facility, 373 Boyd Pond Rd., Aiken, SC 29803; Bill Jackson, (706) 855-0846 or (803) 642-0314

Racer's Choice Remote Control, 4014 Fernandine Rd., Piney Grove Shopping Center, Columbia, SC 29212; Clifford McLinden, (803) 561-0000

World Hobbies, 707 Sulphur springs Rd., Greenville, SC 29611; Bob Pittman, (803) 246-4702 (Closed after 4:00 pm Mondays)

SOUTH DAKOTA

Action R/C Raceway, 107 N. Main, Mitchell, SD 57301; (605) 996-6895

Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604

TENNESSEE

Cumberland Valley Raceway, P.O. Box 233, Ashland City, TN 37015; Jamie Pate, (615) 792-4371, ext. 1195

D&M's Downtown Raceway, 2703 US Hwy. 411S, Maryville, TN 37303; (615) 681-8919

Lawson Raceway, 152 Joel Rd., Oliver Springs, TN 37840; Anthony Lawson, (615) 995-9351

Machine-Head Straits, 938 Grandmere Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630

MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027

Robertson's R/C Raceway, 175 Seavers Rd., Jackson, TN 38301; Travis Robertson, (901) 424-6423

Sparta Raceway Park, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Elrod, Rt. 5 Box #652, Sparta, TN 38583, (615) 836-8450 or (615) 761-3407

Tri-County R/C Raceway, 919 Little Dogwood, 1312 Kingston Hwy., Kingston, TN 37763; Dwaine Romine, Kyle Romine, (615) 376-2330, 376-9955



TEXAS

AA Raceway, 1617 Foomery Rd., Austin, TX 78704; Wolf Gurnforty, (512) 474-8277

Big Mike's R/C Raceway, 1405 W. Cotton St. (behind the Locker Room), Longview, TX 75604; (903) 297-7814

Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Tom Keller, (713) 399-9777

Flip & Spin R/C, 5957 Jones Rd., Bryan, TX 77807; Garland Crabb, (409) 822-7311

Hal's Hobby Raceway, 1440 Bessemer, El Paso, TX 79936; (915) 591-2213

The Hobby Center Raceway, 14104 Stan Schiveter Loop, Suite 1, Killeen, TX 76543; Lawrence Remick, (817) 690-7311

Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (803) 872-6761

Hobbytown USA, 7516 FM 1960 W., Houston, TX 77070; Fred Pfafman, (713) 955-7097

Hobbytown USA, 999 E. Basse Rd., Suite 177, San Antonio, TX 78209; Joe Sena or Clark Baisdon, (210) 829-8697; fax (210) 829-8707

Houston R/C Hobbies, 6338 Skyline Dr., Houston, TX 77057; Lynn Cramer, (713) 266-6006

Indy R/C World, 220 Mesquite Village, Mesquite, TX 75150; (214) 271-4844

Keyser's Hobbies, 1643 Texas, College Station, TX 77840; Bill Bennett (409) 693-8095

North Houston Speedway, 11847 Spears Rd., Houston, TX 77067; Bob or Carol Hillin, (713) 872-2471

Performance Raceway, 1106C Witte Rd., Houston, TX 77055; Frosty Sinclair or Richard Oliver, (713) 464-4458

Playlit R/C Raceway, 3518 W. Loop 306, San Angelo, TX; Sammee Favre, (915) 942-6469

Rivercity Speedway, 11731 Wetmore, San Antonio, TX 78247; Ralph Hernandez, (210) 359-6870; Joe Toledo, (210) 341-5652

Rough Country, 905 Jacksboro Hwy., Wichita Falls, TX 76301-5310; Robert Kerr, (817) 322-2453

Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Mike Hellums, (512) 289-0066; Race Hotline, (512) 881-6105.

T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562

Texas Speedway, 6707 Chimney Rock, Bellaire, TX 77401

T.O. Offroad Raceway, 6236 Quail, El Paso, TX 79924; Eren Saenz, (915) 821-7522

Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Jerry Williams, (214) 438-9224

Fasttrax, 205 N. Carbon Ave., Price, UT 84501; Dave Johnson, (801) 637-6603

Utah

Utah



Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; David Mott, (801) 250-8303



WOR Raceway, 3170 Brinker Ave., Ogden, UT 84401; Brian Worton, (801) 393-2530



VERMONT

Bradford R/C Racing, Main St., Bradford, VT 05033; Seth Bean, (802) 222-9674

Stoughton Pond Raceway, Stoughton Pond Rd., Perkinsville, VT 05151; Adams, (802) 263-9321

VIRGINIA

Bob's Hobbies & Raceway, 910-J Brandy Creek Dr., Mechanicsville, VA 22111; Bob Wagner, (804) 746-2752

Cooper's R/C Raceway, Rt. 4, Box 122B, Chatham, VA 24531; (804) 724-4182

Fairystone R/C Speedway, Rt. 4, Box 918, SR635 Goblinton, Stuart, VA 24171; Pat Moon Jr., (540) 930-3984

Hobby Hangers Speedway, 4433 A Brookfield Corp. Dr., Chantilly, VA 22021; Mark or Billy, (703) 631-8820

The Hobby House, 116 Edds Ln., Sterling, VA 20155; Ron Beckman, (703) 444-0333

KC's Radio Control & Repair, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596

Olde Towne Hobby Shoppe, 9105 Center St., Manassas, VA 22110; Arnie Levine, (703) 369-1197

Roadmasters/Rick's Hobbies, 12201 Balls Ford Ave., Manassas, VA 22110; Rick, (703) 330-6833

Shamroc Raceway, P.O. Box 3739, Winchester, VA 22601; Kevin Allen, (703) 662-0403

Trackside Hobbies, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell or Tom Gunther, (804) 723-4170

Washington

Allie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638

Burien Toyota R/C, 15025 1st Ave. South, Seattle, WA 98148; Ray Med, (800) 654-6456

Washington

WASHINGTON

Allie's, 108 South K St., Aberdeen, WA 98520; (206) 533-6638

Burien Toyota R/C, 15025 1st Ave. South, Seattle, WA 98148; Ray Med, (800) 654-6456

Washington

KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

PRO-LINE TRACK DIRECTORY

Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary & Sharon Brown, (360) 491-2430
A00000

Hale's R/C Raceway Park, 10611 136th St. E. Puyallup, WA 98374; Walt Hale, (206) 845-7675
A00000000000

Home Town Hobby, 116 N. Main Ave., Ridgefield, WA 98642; (206) 887-1769
00000000

Jim's Wings & Wheels Raceway, 1827 S. Washington, Kennewick, WA 99337; (509) 586-7420
00000000

L&L R/C Raceway, 15818 S.E. 287th, Kent, WA 98042; Bob Lewis, (206) 631-1664
00000000

Rattlesnake R/C & Raceway, Brag T-121 Big Pasco, Pasco, WA 99301; Bill Brandt, (509) 545-4495
A00000

Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Faila, (206) 653-8838
00000000

Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Matson, (509) 534-RACE
A000000000

Tacoma R/C Raceway Hobbies, 6305 6th Ave., Tacoma, WA 98406; Neil Bade, (206) 565-1935
A00000

Terror Raceway, 8012 S. Tacoma Way, Tacoma, WA 98499; Dave Kleinman, (206) 584-8859
000000

WASHINGTON, D.C.

BAFB R/CAR, Bolling Air Force Base, Washington, D.C. 20332; Charles Leadbetter, (301) 297-4524
A000000000

WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St., West Union, WV, 26456; Mark Travis, (304) 873-2487
0000

Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355
A0000

Left Turn Hobbies, 100 Saco Ln. (by Post Office), Glen White, WV 25849; Stretch, (304) 255-3930
A0000000

WISCONSIN

ABC R/C, 1441 B East Main St., Waukesha, WI 53186; Dick, (414) 542-1245
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Bayland Hobbies, 951D Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge, (414) 339-8288
A000000000

JJ's Dirt Heaven, 6028 County Road K, Champion, WI 54229; Jim or Jeff Jansen, (414) 866-9096
A0000000

Mid-West Tri-Clone, 3745 Shuster, West Bend, WI 53095; Tom Holz, (414) 334-0429
A000000000

NARCAC Raceway, 4331 E. Wall St., Eagle River, WI 54521; Mary O'Brien, (715) 479-5154
00000

S&N's Trackside Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910
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Sparta R/C Raceway, R&S, Sparta, WI 54656; Eric Johnson, (608) 269-6613
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WYOMING

Collectable Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156
00000000

AUSTRALIA

Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128
A00

Canberra Off-Road Model Car Club, Goyder St., Narrabundah, ACT 2604; Graham Brown, 61-6-241-3070
00000000

Central Coast ORRC, EDSACC Sports Complex, Bateau bay, N.S.W. Australia 2261; Peter Knight, 011-61-43-693-698
00000000

Illawarra RCECC, Croome Sporting Complex, Albion Park Rail, NSW 2527; Mel or Andrew, 042-714-683
00000000

Lakeside R/C Racing Car Club, Hollywood Dr., Lansvale, NSW 2166; R. Bartolozzi, 62-2-907-9800
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Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 011-6160-247-128
0000

BELGIUM

Cartroubles Indoor Buggy Track, Jan Moonsstraat 52-56, 2160 Wommegem, Belgium; Guy Ermes, 32-3-326-51-15; fax, 32-3-326-51-01
A0000000

M.B.V. Parc de Reist, Tenierslaan, 28. B1910 Kampenhout, Belgium; Frank Mestrey, fax (32) 0-16657518
00000000

MBV-Kampenhout, Tenierslaan 28, Kampenhout B1910, Belgium; Frank Mestrey, phone and fax (0) 16-65-75-18
00000000

MRCZ, Centrum, De Burg, Belgium; Montje, 75-71-63
00000000

Model Racing Club Oudenaarde, Scheidekant, 9700 Oudenaarde, Belgium; A. Chanterle, 32-55-31-36-48; fax, 32-55-30-19-12
00000000

BRAZIL

Brasilia R/C Motor Circuit, Estacionamento do Estadio Mane Guarrincha, Brasilia, DF 70000, Brazil; Alexandre (Alex), 55-061-273-7205
00000000

Hobby Center, SQS.210 Bl.H Apt. 204, Brasilia, DF-Brasil 70.273; 061-242-0488
00000000

Jungle Drive, Rua Alberto Maranhao, No. 219 Icha do Gov, Rio de Janeiro, 21940-490; Paulo Brito, (021) 396-0851 or (021) 393-7449
0000

Off Roaders, Ave. Guilherme Dummont Villars, 317, Sao Paulo, CEP 05640; Waldir Ielpo, (055) 011-260-5628; fax (055) 011-831-4931
0000

Way of R/C Off-Road Cerrado, Rua Paraiba 1323, 1st floor, Belo Horizonte, Minas Gerais; Claudio T. Correa, (031) 227-6111, fax (031) 227-6869
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CANADA

Action Wheelz, 462 Turcotte, Vanier, Quebec G1M 1R6; Regent Tardif, (418) 527-5756
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A&J Toronto R/C Raceway, 24 Main St., Building B, Unionville, Ontario L3R 2E4; (905) 305-1479
A00000000000

ATN, Auto Teleguide Nicolet, 2000 Rue Paul Hubert, Saint-Jean-Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097
00000000

Auto Sprint, 6065 Des Grands Prairies, St. Leonard, Quebec H3G 2R6; David Kalayjian, (514) 287-3503
A00000

Circuit Pepsi, Centre de Location, 37 du Rot, Sorel, Quebec; (514) 746-8828
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Circuit Plessis, 260 Rang 9 Ouest, Plessisville, Quebec G6L 2Y2; (819) 362-3743
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Circuit R/C Pro, 1500 Chemin Sullivan, Val d'Or, Quebec; JSP 1M1; R/C Modele Plus, (819) 874-3918
A00000

Circuit Teleguide St. Roch, 363-B St. Charles, St. Roch de L'Achigan, Quebec J0K 3H0; (514) 588-4254, fax (514) 588-6554
A000000000

Club Avall, 244 Jules-Richard, Deauville, Quebec J1N 3M2; Daniel Vanier (819) 864-6262
000000

Club RC51, 44 Rue Holliday, Sept-Iles, Quebec G4R; Sylvio Gerard (418) 968-6575; hobby shop (418) 962-6565
A00000000

CRCC, Box 309, Clinton, Ontario NOM 1L0; Eric Russell (519) 482-9429
00

Dynamic Hobbies, 21 Concourse Gate, Unit 6, Nepean, Ontario K2E7S4; Clark Freeman, (613) 225-9634
0000000000

East Coast Model Center Raceway, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island C1A 8X9; Gary Stephen, (902) 569-3262
00000000

Evolution Speedway, 1935 Glengrove Rd., Pickering, Ontario L1V 1X3; Eric Lang, (905) 839-2084
00000

Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411
A00000

Fly'n Bryan's Radical Raceway & Little Shop of Hobbies, RR #1, Site 12, Comp. 49, Chase, British Columbia, Canada V0E 1M0; Bryan Coffey/Dani Potvin, (604) 955-0669
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Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliott, (519) 354-5530
A00000

Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Varnieuwenhuizen, (604) 374-1268, (604) 374-8458
00000000

J-T International Raceway, 127 Milligan Lane, Nanaimo, Ontario K7R 8A1; N. O'Neill, (613) 354-0099
A00000

Mid-Canada R/C Speedway, 1678 St. James St., Winnipeg, Manitoba R3H 0L3; Richard Driedger, (204) 339-6566
A0000

Minatures & Passions, 204 St. Charles, #103, Ste. Therese, Quebec, Canada J7E 2B4; Gilles Lachance, (514) 979-7989
00000

MORRAC Raceway, 6449 Crowchild Tr. SW., Box 36060, Calgary, Alberta T3E 7C8; (403) 254-1386
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Off-Road R/C Raceway, 76 Eddystone Ave., North York, Ontario M3N 1H4; Ron Lefebvre, (416) 740-0536
A0000000

Prince George Radio Controlled Car Club, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 561-0035
0000

Quintrax Speedway, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax (613) 962-7306
A0000000000

Randy Shantz Raceway, 1015 W. 14th St., North Vancouver, British Columbia; Steve Mulhall, (604) 945-3888
000000

RC World, 7070 Haldibrook Rd., RR #1, Caledonia, Ontario N3W 2G8; Don Nicholls (905) 679-3177 or Keith Sequin (905) 388-9855
00000000

Recreation R/C Raceway, Hwy 16 and Ferry Ave., Prince George, BC; Doug Waller, (604) 561-0035
0000

Ronbo's R/C Racing, RR 1 Glen Walter, Cornwall, Ontario K6H 3G4; Ron Giroux, (613) 936-0176
A00000

Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateaugay, Quebec J6K 3B4; (514) 688-2151
A00000

Sheldons Raceway, Box 597, Cutknife, Saskatchewan; Sheldon Bradlow, 398-2232
00000

Spininn Wheel Raceway, RR 1, Ariss, Ontario NOB 1B0; (519) 824-1614
000

South Okanagan Roadhops, Skha Lake Rd., Penticton, BC; Willie Lemm, (604) 492-5698
0000

Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855
0000

Sudbury Organized Auto Racing, 765 Barrydowne Rd., Sudbury, Ontario P3A 3T6; Sheila Proulx, (705) 524-5339
A00000

Thunder Alley Raceway, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P8; Rob Smith, (519) 882-3361
000000

Vancouver R/C Road Racers, #100-2733 Barney Hwy., Coquitlam, British Columbia V3E 1K9; Roger Brown, (604) 945-3888
A0000

COLUMBIA

Club De Automodelismo Colombiano, Centro Recreativo Cafam, Kilometro 14 Autopista Norte, Santafe De Bogota, D.C. Colombia; Jorge Delgado, 1-6130588
00000000

Club De Automodelismo Colombiano, Centro Comercial Guaymaral, Kilometro 16 Autopista Norte, Santafe De Bogota, D.C. Colombia; Jorge Delgado, 1-6130588
000000

Garoso Raceway, Avenida Libertadores con Diagonal Gran Colombia, Cucuta, Colombia; Gabriel Rodriguez, 975-751892
00000000

CYPRUS

Racing Model Club, Kennedy Ave. N. 42, Nicosia, Cyprus; Andrea Sotiriou, 493186; fax 493229
000000

DENMARK

Brondby Motor Club, Roskildevejs 460 Rodovre, Denmark 2610; Soren Boy Holst, 011-45-31-472-462
A00000

Holstebro R/C Buggy Club, Mozartsvej 7500 Holstebro, Denmark 2600; Michael Brushholt, 011-45-97-412-734
000000

Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691
00000

Rainbow Raceway, Eriksvej, 9 Glostrup, Copenhagen 2600; P. Christiansen, 011-45-52-848-504
00000000

Thor Minirace Odense, Sohusevej 255, Alsio, Odense, Behind Alesso Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707
000000

DOMINICAN REP.

Adoca R/C Speedway, Feria ganadera Santo Domingo; (809) 220-5266
000000

La Barranquilla R/C International Speedway, Santiago; (809) 582-230
000000

ECUADOR

Hobby Centro A.C.R.O. Club, Via a Turi Km O.S., Cuenca-Ecuador; Teddy Jaramillo, 593-7-831-289; fax 593-7-817082
000000

ENGLAND

Chessington Radio Car Club, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey, England; Ian Spiller, 0252-20657
00000000

Hinckley RCCC, Three Pots Inn, A5 Waltham St., Hinckley, Leicestershire, UK; Bruce, 01455-890580
A0000000

FRANCE

Auto Electron, 35, rue B. de Ventador, Limoges, France 87000; M. Boudoul, 55 062763
A0000000

Crame Roncq, 64 rue du Becquerel, 59370 Mons el Barceul, France; Michael Hondeky, (33) 2042755
00000000

Lorgies Bolides, rue Beau-Riz, 62840 Lorgies, France; Mme. Hourdequin Sabine
A0000000

GERMANY

Dreykorn Raceway, Hauchlinger-Hauptstr. 43, Lauf, 91207; Hermann Hensel, 09123-81457
A0000000

MC Köln, Bottgerstr., Worringen, Germany 50769; Ralf Habel, 02733-477493
00000000

Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609
A0000

Oberhausen-Altstaden, Am Fserderturn, Oberhausen, Germany 46099; Josef Holl, 0208-403676
00000000

Panik Raceway, Teutonen Str. 5, Jroisdorf, Germany 53844; Guido Kraft, 0224-400259
000000

Stoppelhoser Oberhausen, Niebuhrstr., Oberhausen, Germany 46049; Matthias Reckward, 02801-1545
0000

GUAM

R/C International Raceway, P.O. Box GK, Agaña; Robert (Buddy) Simpkins, (671) 477-3207
00000000

KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

HONDURAS

Accion, Quinta Santa
Pedro Sula, Honduras,
Iviera Hernandez; Eduardo
504) 52-2061

HONG KONG

Model Car Racing Club, Lot
Ko Po Tsuen, Sha Tau Kok
Hong Kong; Alex Chan, (852)

Buggy Arena, Wong Chuk
age, Shatin, N.T.; Pak Yeung,
-0828

INDONESIA

Jah Speedway, J1 Cipaku
Bandung 40143, Indonesia;
Jah Hotel, Brad Lake, 011-
0219

Racing, Palm St., 188,
ua, Jatim, Indonesia; Jhon
11-62-31-595-888

Cabelecut, J.L. Kunir No. 83,
Cabe, Ciputat, Jakarta,
nesia; Ali Agus Salim, 7403568-9;
7491533

ISRAEL

Ircca Off-Road, Rahanana, Israel;
Yaron Zafris, (972) 030549937

Shoshoneat, Abba Nile Silver Str. 64,
Haifa, Israel 32809; Golan Levy, (972)
039386444 or (972) 04231252

ITALY

Associazione Modellisti Cossato, via
P. Maffei, Cossato 13014, Biella, Italy;
Anellato Romildo, 015-405881; fax
15-922709

JAPAN

Courtney Off-Road, Camp S.D. Butler,
Okinawa, Japan, FPO AP 96379; USMC
Arts & Crafts, 011-81-61173-53674

Foster R/C Raceway, Camp S.D. Butler,
Okinawa, Japan, FPO AP 96379;
Camp Foster Arts & Crafts, 011-81-
61173-53674

Hansen Off-Road, Camp S.D. Butler,
Okinawa, Japan, FPO AP 96379; USMC
Arts & Crafts, 011-81-61173-53674

Iwakuni R/C Track, PSC 561, Box 978,
FPO AP 96310-0978; David T. Eck,
011-81-61173-53662

Misawa R/C Raceway, PSC 76, Box
2946, APO AP 96139-2946; Terry
Branchau, (011) 81176535181 ext.
222-5324

Yokata R/C Racers, PSC #78, Box
3619, APO AP 96326, Tokyo, Japan;
Victor Giles, 011-81-0425-52-2511 ext.
25-9025

Zama Off-Road Raceway, 17th
ASGCM Unit 45013, Box 3232, APO
AP 96338 Japan; SFC Ken Campbell,
011-81-3117-63-8478

LEBANON

Wild Willy RCC, Oscar St-Jal Eddie,
Beirut, Lebanon; 00961-1-403751

MEXICO

Alces Off Road, Lopez Mateos y
Rayod S/N, Ensenada, Baja California,
C 22830; Jorge Bustamante, (667) 6-
1476, 61477, 86729

Baja Jr., H. Valdez 151 Pte. Y Gmo.
Prieto, Los Mochis Sinaloa 81200;
Memo Asencio, Gaby Macias, 681-
20276; fax, 681-26430

Philippine F1/Touring Club, Super Mall
I, EDSA, Quezon City 1156; Raymond
Aguilar/ Ron Villafior, 896-64-15/23-
30-08

Club Kyosho de Automodelismo
Departino, Av. Pacifico 216 Coyoacan;
Ajusco-Toluca Km 15.3 DE, Mexico
04330, Ing. Jorge Perez Holder, (525)
544-08096; fax, (525) 544-7133

Hobby Centro, 12 De Diciembre No.
3070-A, Guadalupe, JAL 45550;
Alejandro Ortiz Del Toro, (36) 21-46-28

Hobby's Formula, Au observatorio 457
DF 01120; (905) 502-3620

Hobby Model's Raceway, Blvd. Garcia
de Leon, 1555, Morelid, Michoacan
58260; (431) 5-01-22

Jaguar R/C Club, Calz. Zavaleta 116,
Puebla 72150; Chema, Denise or
Chiro, (22) 31-00-91, (22) 33-00-94

La Hielera, Prol Corregidora Nte 350,
Queretaro, QRO C.P. 76160; Jorge
Morelos Rabell, (42) 12-15-25

Pista Casino, Hotel Casino de la Selva,
Cuernavaca, Morelos 16507; Luis
Duhart, (73) 19-12-38

R/C Racing Club, Obsidiana #2900,
Zapopan, Jalisco C.P. 44560; Fernando
Hernandez, (3) 616-73-47

Tony's Track, Obregon 364 Sur,
Culicán Sinaloa; Guillermo Prieto, (67)
165708-168141

NETHERLANDS

H.F.C.C. Hollandia, De Wert 60, The
Hague, The Netherlands; G. de Jong,
031-070-3679820

NEW ZEALAND

Capital Model Racers, Avalon, Lower
Hutt, New Zealand; Roger Whitmarsh,
04-566-5714

Counties R/C Raceway, Pukekohe
Showgrounds, Station Rd., Pukekohe,
New Zealand; R. Northcott, 09 23
86904

Harewood Radio Control Car Club,
550 Sawyers Arms Rd., Christ Church,
New Zealand; Dean Johnson, 09 03
3880 344

M.A.C. Vlymen, Hendriklaan 6,
Vlymen, Netherlands; Ju Kasteren, 011
31 73 517906

Papakura Indoor R/C Car Club, 25
Tainere Cres., Papakura, Auckland;
Colin Perry, (09) 298-4711

Western District R/C Off-Road Car
Club, CNV Bancroft/Akatere Drive,
Auckland; Chris, (09) 838-5201

NORWAY

Aurskog R/C Club, Aursmoen, 1930
Aurskog, Norway; Tommy Gjeleseth,
47-63-86-21-61

Dalen Raceway, P.B. 728, 6401 Molde,
Norway; Johnny Reitan, 94 64 52 95

Hadeland Raceway, 2750 Gran, 6130405
Norway; Dag Bakke-Nilsen, 61330405

Store-Baller Raceway, 2750
Gran, Gran Norway; Ola Raastad,
61330225

PHILIPPINES

Boyet R/C Hobby Shop, Unit No. 10
Lucas Commercial Center, Marcos
Hiway, Juneamot, Antipolo, Rizal; Jose
"Boy" Chua, 721-2555

Philippine F1/Touring Club, Super Mall
I, EDSA, Quezon City 1156; Raymond
Aguilar/ Ron Villafior, 896-64-15/23-
30-08

Philippine R/C Association, B.F.
Homes Paranaque Metro Manila 1700;
Ronald/Manny Villafior, 23-30-08

Quezon City Radio Control Club,
Quezon City Memorial Cir., Quezon
City; Benjie Lumanlan, 731-94-53

PORTUGAL

Aero Clube da Madeira, Rua do
Castanheiro E-2, Funchal, Madeira,
Portugal; fax 091-221265

SOUTH AFRICA

Banana County R/C Racing Club, P.O.
Box 988, Margate, 4275; Dennis
Steenmans, 27 (0) 391-20975

Gordons Bay R/C Club (GBRC),
Andrew Norman Sports Centre,
Gordons Bay, Cape Province; Andre
Hollander, 024-512865

Helderberg Radio Control Car Club,
De Beers Soccer Field, De Beers Ave.
Somerset West, Cape Province; Andre
Hollander, (024) 51-2865

Lowveld Radio Control
Thunderdome, Lion's C/ub
Kanyamazne Rd., Nelspruit, Eastern
Transvaal; Martin Van Der Merwe,
(01311) 534-6415

Parow Radio Car Club, Northern
Sports Complex, Parow, Cape Province;
Stirling Spengler, (021) 945-4957

Phoenix Raceway, 11 Tugela St.,
Stiffontein, Transvaal; Lionel Edwards,
(018) 4842863

Pietersburg Model Racing, Landros
Marais St., Pietersburg, Northern
Transvaal; Peter Van Vuuren, (0152)
293-0700

R.C. Superbowl, Elsburg Sports
Grounds, Elsburg, Johannesburg; Karl
Fawcett, 27119076145

R.A.C.E. Off Road, Cecil Payne
Stadium, Maraisburg, Gauteng; Derrick
Plank, (011) 682-2173

Rustenburg Off-Roaders, Olympia
Stadium, Rustenburg, Northwest
Province; Jan Van Vollenhoven, (0142)
24-846

Pretoria Off Road R/C Club, Joost
Bekker Caravan Park, Juneville,
Pretoria, Gauteng; Gert Swart, (012)
377-3238

SPAIN

ADAM, Mina Flores de la Sienna,
Madrid, Spain Alvaro Sarabia, 01-
7471113

A.D. Diablos, Morata De Jalón,
50.260 Zaragoza, Spain; Juan Carlos
Vicente de Vera, 34-76-605350

Club Modelismo Catilla, P.O. Box 491,
Burgos, Spain 09080; A.J. Pereda,
011-34-47-240130

Club Social Sevillana, Crta. Pulianas
S/N, Granada, Spain; Oscar Saenz,
958-275282

Motoclub Castellón R.C., Rafalafena,
S/N, 12004 Castellón, Spain; Octavio
Traver, (34) 64 229705, (34) 64
237411

Outlaw-Ultima II, Puerto Rico 27,
Madrid, Spain 28016; Juan Vacas, (34)
915197298

ROARCR, Naval Station, Rota, Spain
(P.O. Box 53, FPO NY, NY 09540-
0013); PO Kelly Sexton, 011-34-56-
822652

SWEDEN

PROCAR Speedway, Industigratan 8,
430 20 Veddige, Sweden; Lars Nordin,
46-0-340-38784; fax 46-0-340-38694

Amalie Racetrack, Hjort Vagen 14, 5-
46632 Sollenbrunn, Sweden; Tage
Johansson

SWITZERLAND

E.M.B.C.M. Raceway, Main
Street opposite police station, 8854
Siebren, Switzerland; Markus Schmid,
01-9233621

ERM Raceway, 14 Ch de Tavernay,
1218 Grand-Saconnex, Switzerland;
M. Maurer, 19-41-22-798-9765

THAILAND

Bangkok R/C Spa Huamark, 164/1
Lardprao Soi 96, Wangthonglang
Bangkapi, Bangkok, Thailand 10310;
Mr. S. Sanghavi, (662) 931-8390,
fax (662) 587-1186

TURKEY

Mosi-Oa-Tunya, H9619 Highland
Harare, Harare Country, Masioraland,
Zimbabwe; 46237

B&B 070 Güven Raceway,
Gaziosmanpasa Sokak Kadiöky,
Goztepe Parki, Istanbul, 0216-
4186118, or 0216-3490742

VENEZUELA

R/C Mariche, KM4 Zona Industrial, Del
Este Via Mariche, Caracas, DF 1070-A;
Bruno Morganti, 58-02-241-3969 or
241-4993

Santa Paula R/C Club, Polideportivo
de Santa Paula urbanization Santa
Paula El Cafetal, Caracas, P.O. Box
66886 Plaza las Americas; Isaac
Abecasis 02-2423954 or Franco
Agrusa 02-4510314

WEST INDIES

Island Raceway, 8 Mile Post Jacks Hill,
St. Andrew, Jamaica, West Indies; Rodney
Littau, (809) 926-7034 or 927-1198

ZIMBABWE

Mosi-Oa-Tunya, H9619 Highland
Harare, Harare Country, Masioraland,
Zimbabwe; 46237

PRO-LINE

Attention Track Owners!

We've updated and expanded our Track Directory—and you can get in on the action! Just complete and return this coupon, making sure the information you give is accurate.

Remember, it's free!

Track Name _____

Contact _____

Address _____

City _____

State _____ Zip _____

Phone no. (required) _____

Please check all which apply:

- ☐ Indoor
- ☐ Outdoor
- ☐ Off-road
- ☐ Oval
- ☐ Banked
- ☐ Dirt
- ☐ Carpet
- ☐ Concrete
- ☐ Asphalt
- ☐ On-site hobby shop
- ☐ AC power
- ☐ Automatic lap-counting
- ☐ Food available

Return to:
Track Directory
Radio Control Car Action
251 Danbury Rd.
Wilton, CT 06897

Chris'

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This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897. My internet address is: chrisc@alrge.com

Might these be artistic tendencies I see? I do believe so. You guys make me proud! Have you ever seen the like? I particularly like the...how shall I put it...the exhibits with an "impressionistic" approach. They do exemplify a unique perspective—one with a certain "twist," don't you agree? What a delightful menagerie of mutant masterpieces.

This much is certain: you guys (our readers) are ever-present in my maniacal mind. So I invite all of you R/C artisans to submit your finest work to "MacSkippy's Gallery." Did I ever tell you about MacSkippy? I don't believe I have. He's my identical twin from Scotland—someone about whose existence I've been in denial until very recently. I do feel badly about that, but I mean, it's that kilt thing he runs around in, ya know. MacSkippy insists on wearing it to races, which is OK—really, but when he's called on to do some fast-paced track-marshalling, well, quite honestly, it has caused the family a good bit of embarrassment.

Anyway, whenever he feels like it, MacSkippy will judge the entries and award a prize of a one-year subscription to *Car Action*.

Don't be shy; be a *Braveheart* and send in your most creative (and/or twisted) renderings to MacSkippy's Gallery. Don't think about it. Just do it; and do it now, lads.

MacSkippy's Gallery

Karlo Malabanari
1241 Mariposa St
Glendale, CA 91205

Above: Karlo Malabanari, Glendale, CA.

Below right: Ashton Ellis, Fort Dodge, IA.



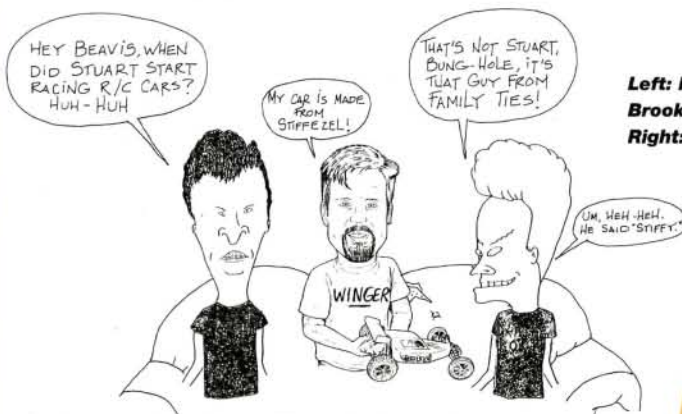
Above: Mark Carrancho, Oxnard, CA. Below: Jonathan Ayers, Temecula, CA.



Ashton Ellis
14 1st Ave NW
Fort Dodge, Iowa
50501



Left: Frank Remick, Brooklawn, NJ.
Right: Scott Bradford.



Above: Christian Ginter, Ocala, FL.
Right: Todd Russell, Franklin, OH.



Above: Todd Russell, Franklin, OH.

